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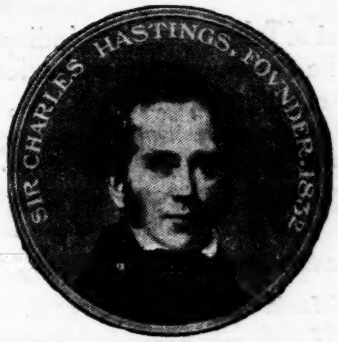

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ON THE

CLINICAL TYPES OF CONVULSIVE SEIZURES IN VERY YOUNG BABIES.

WITH A SPECIAL CONSIDERATION OF THE SO-CALLED "IDIOPATHIC CONVULSIONS OF EARLY INFANCY," AND THEIR TREATMENT.*

BY

JOHN THOMSON, M.D., F.R.C.P.EDIN.,

CONSULTING PHYSICIAN TO THE ROYAL EDINBURGH HOSPITAL FOR SICK CHILDREN.

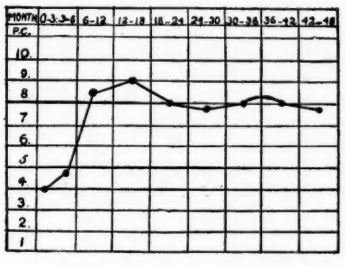
THERE are few clinical phenomena more familiar to us as medical practitioners than the convulsions of infancy, and very few which present more features of interest. We have learned many things about their causation and results, but there is still a great deal waiting for us to find out by careful clinical observation, as well as by the, to some extent, more exact methods of the laboratory. You will therefore, I hope, agree with me that they form a theme to which we may profitably turn our thoughts for a short time.

As the subject of infantile convulsions in general is rather large and many-sided to be considered adequately in one lecture, I propose to limit my remarks to a consideration of the causation, diagnosis, prognosis and treatment of those varieties of convulsive seizure which may be met with in very young children—those of three months old and under—and to draw your attention particularly to the clinical features, treatment and etiology of a type of so-called "idiopathic convulsions" in little babies which presents a number of points of especial interest.

One small detail regarding the incidence of fits in infants at this age may be noticed in passing—namely, that, in spite of the frequency of birth injury to the brain, which acts as a cause of convulsions mainly in the first week, and the occurrence of certain other forms of convulsions in young babies which are rarely present in later infancy, fits are less common in the early weeks of life than in older infants. Probably the main reason of this is that spasmophilia, which has such a strong effect in producing a convulsive tendency, is never seen before the third and only rarely before the fifth month.

The accompanying table and chart show the frequency with which first convulsions occurred at different age periods in 4,348 children under 4 who attended my out-patient clinic many years ago.

Percentage of Cases of Convulsions beginning in different Six-month Periods, among 4,348 Out-patients under Four Years old.



Age at time of first Convulsion. Age Period.	Percentage.
Birth to 3 months	3.5
3 mths. to 6 mths.	4.2
6 ,, 12 ,,	7.8
12 ,, 18 ,,	8.8
18 ,, 24 ,,	7.3
24 ,, 30 ,,	7.1
30 ,, 36 ,,	7.5
36 ,, 42 ,,	7.6
42 ,, 48 ,,	7.2

It will be seen that the fits began during the first three months in only 3.5 per cent. of the cases, during the second six months in nearly 8 per cent., during the third six months in nearly 9 per cent., and during the later six-month periods in between 7.1 and 7.6 per cent. of the cases.

I have recently been studying the notes of 200 cases of convulsions in infants of 3 months and less. These have brought out some points of practical interest; and it is chiefly to the information derived from them that I wish to direct your attention now.

CAUSES OF CONVULSIONS.

The causes of convulsions in very young babies are numerous and of many kinds. These, so far as I have been able to diagnose them in my cases, may be divided into three groups.

A. *Local Injury or Disease of the Brain or its Membranes.*

1. Birth injury (intracranial haemorrhage, etc.)	37
2. Meningitis	7
3. Hydrocephalus	4
4. Other brain lesions (acquired and congenital)	5
5. Congenital idiocy from arrest of cerebral development (with *petit mal*)	18

B. *Cerebral Disturbance due to Acute Disease of Organs other than the Brain.*

1. Food disorders (functional and organic dyspepsia)	46
2. Jaundice of various kinds	2
3. Genito-urinary (infection of the urinary tract with *Bacillus coli*, etc.)	5
4. Bronchitis and bronchopneumonia	8
5. Choroiditis, otitis, congenital heart disease	4
6. Unknown causes	7

C. *Cerebral Disturbance connected with Various Forms of General Infection and of Debility.*

1. General tuberculosis	7
2. Congenital syphilis	10
3. Debility	2
4. Whooping-cough	3
5. "Idiopathic convulsions"	35

The number of cases due to each of the various causes in this list cannot be held as representing accurately the relative frequency of the different causes as they occur in ordinary practice, for they have been taken almost only from hospital and consultation practice, in which the cases due to more serious and unusual causes necessarily bulk much more largely than those which are obviously the result of passing conditions, such as indigestion.

Let us consider these various causes one by one in detail.

A.—LOCAL INJURY OR DISEASE OF THE BRAIN OR ITS MEMBRANES.

1. *Birth Injury.*

Injury to the brain during labour, which is often accompanied by intracranial haemorrhage, is a frequent cause of death at or soon after birth. Although most of the children with such injuries are stillborn or die within a few hours, there are many who survive, and in later life a large proportion of these present physical or mental signs of severe and permanent brain lesions. Convulsions are among the earliest and most striking symptoms in these cases.

When convulsions arise from this cause they almost always begin within the first few days of life, and certainly a large majority of the babies who take fits before the end of the first week are suffering from some intracranial lesion of this sort.

Thirty-seven of my 200 cases of convulsions evidently belonged to this group. In more than three-quarters of these (29) the fits began on the first, second, or third day, and only in five were they deferred beyond the first week. Boys were much more often affected than girls (29 to 13).

The diagnosis of brain injury as a cause of convulsions in any case depends on the character of the labour—on whether it was premature, on the date of the onset of the symptoms, and on the child's condition at and soon after birth, especially on the occurrence of asphyxia, with difficulty in getting respiration established. The diagnosis is strongly confirmed if the fontanelle is found to be bulging soon after birth, or if the fluid obtained by lumbar puncture is blood-stained.

Much valuable light on the morbid anatomy and etiology of birth injuries to the brain may be obtained from such recent work as that of F. J. Browne[1] and Eardley Holland[2] on the causes of stillbirth. The subject is too large to be fully considered here, but I should like to draw your attention to some of the statistics in Dr. Browne's able and practical paper, and especially to his conclusions as to how the risk of such injuries may be lessened, or altogether prevented, by care on the part of the obstetrician.

In many circumstances the adventure of birth is inevitably a more or less perilous matter for the baby; but it seems certain that by forethought and patience, and by choosing, when possible, those methods of delivery which have been found to be safest for the child, a great deal can be done to lessen or prevent the risk of intracranial

* Delivered to the Manchester Medical Society on October 5th, 1921.

injury. Dr. Browne's conclusions seem to me of great practical value, and he has kindly allowed me to quote them here.

Cerebral haemorrhage was found in 29.5 per cent. of 200 cases of infants who were either stillborn or died soon after birth. The condition was ten times as common after breech as after vertex presentations. In vertex cases it was met with mainly in difficult forceps deliveries, but it was also apt to occur in ordinary easy forceps cases if the labour was hurried for any reason. It was never found in any case of full-time vertex presentation when the labour had been natural.

One of the commonest lesions found in stillborn children is tearing of the dura mater. This lesion was present in 37 per cent. of the 94 cases in which it was looked for; but in only 40 per cent. of these had it caused any haemorrhage. It was about sixteen times as liable to occur in breech as in vertex presentations; indeed, some damage to the dura mater was found in all breech cases, whether easy or difficult, full-time or premature. In vertex cases tentorial tears were found, mostly after difficult forceps deliveries, but they occurred sometimes in spontaneous deliveries, when the labour had been prolonged and moulding of the head had therefore been excessive. Tentorial tears were never found after normal vertex deliveries.

Prematurity appeared to be a serious cause of cerebral haemorrhage; and premature babies, especially those between 7 and 7½ months, seemed to be about sixteen times more likely than full-time infants to suffer from this lesion. In them the haemorrhage was not due to tears of the dural septa, but was probably to be accounted for by overfilling and bursting of the fragile cranial veins, along with decreased coagulability of the blood. It occurred about seven times as often in breech as in vertex cases. A haemorrhagic diathesis played, apparently, no important part in the causation of the bleeding.

Intraventricular haemorrhage occurred in 8.5 per cent. of the cases examined. It was found in premature cases only, and seemed to be due to the same conditions as have already been mentioned as accounting for other forms of intracranial haemorrhage in premature babies. No symptoms were noticed in these cases which could have given grounds for a diagnosis of the condition during life; and there was no reason to think that any of them could have been permanently cured by operation for removal of the clots.

It is significant that only two of Dr. Browne's cases were considered to have received adequate antenatal supervision. The points which Dr. Browne recommends to be kept in view for the prevention of cerebral haemorrhage during delivery are the following:

1. *Avoidance of breech deliveries*, by cephalic version of breech presentations at a period when this is always possible—namely, not later than the seventh or eighth month.

2. *Avoidance of Difficult Forceps Deliveries.*—This is only possible when there is careful antenatal supervision of every case.

3. *Avoidance of induction of premature labour*, certainly till after eight months; better still till after eight and a half months.

4. *Manual dilatation of the parturient canal* for the passage of the premature infant, and preservation of the membranes unruptured as long as possible.

5. Finally, after the study of a large number of cases, it was found impossible to avoid the conclusion that it was only by *adequate antenatal supervision of every pregnant woman* that the present high morbidity rate from cerebral haemorrhage could ever be seriously diminished.

Prognosis.—A serious prognosis must, of course, always be given when there is evidence of a severe birth injury to the brain having occurred. Many of these cases recover to a surprising degree; but the outlook is always anxious, even when the grave symptoms have apparently passed off completely. In several children who have seemed to make a satisfactory recovery, I have found some degree of mental defect or instability, or a tendency to epileptic seizures, in later childhood. Spastic rigidity of the limbs not infrequently develops, and this condition, even when it is very slight in degree, is likely to persist through life.

Treatment.—Early operation to remove the intracranial clots has been recommended by Cushing and other surgeons; but it is very doubtful whether this is often of permanent benefit. Certainly, in most cases, nothing can be done beyond careful attention to the general nutrition and treatment of any symptoms that may arise.

2. *Meningitis.*

In seven of my cases the fits were evidently due to this cause. In the last four of them meningococci were found in the cerebro-spinal fluid, and the others were probably due to the same cause. Six of the children died and one recovered with hydrocephalus.

3. *Hydrocephalus.*

In four other cases internal hydrocephalus of uncertain origin was present. Two of these died in infancy and the others survived to adolescence; one of them was feeble-minded and the other idiotic.

4. *Other Brain Lesions.*

Other brain lesions of a more or less obscure nature were found in five cases.

5. *Congenital Brain Defect with Petit Mal Attacks.*

One sees many cases of this type during the earlier part of the first year of life. Eighteen of my 200 cases in very young babies belonged to it. A large majority of the patients (13) were girls. In most of the children the attacks began very insidiously, and their grave significance was generally overlooked at first by the parents, who referred to them as "turns," or "faints," or "starts."

The seizure generally consists in a sudden momentary jerk forward of the head and shoulders, with the arms extended and somewhat adducted and pronated. The child loses consciousness for a few seconds, and on coming round often cries bitterly as if in pain. After the attacks have gone on recurring for a year or two they are apt to be accompanied or replaced by regular epileptic seizures. Sometimes, though by no means always, the parents have noticed from the first that the baby has not been as bright as she should have been. Always, as she grows older, she becomes less and less intelligent, the mental deterioration being much more rapid when the fits are numerous, and some slight improvement usually occurring, during the earlier stages of the case, when they are few in number or absent for any time. The child is very late in holding up her head, if she is ever able to do so; and the cranium remains far too small.

Etiology.—The causation and pathology of this condition is, so far as I know, quite unknown. The fits are probably connected with a congenital arrest of development of the brain cells. The mental defect is due mainly to the same cause, but it is always aggravated, as already mentioned, by continuance of the attacks.

The *prognosis* is extremely bad. The children all become quite idiotic, although they may live to adolescence or even to adult life.

The *treatment* also is most unsatisfactory. Bromides and chloral are rarely even of temporary advantage. Occasionally a tonic or some regulation of the diet may cause improvement in the symptoms for a time; and now and then a feverish illness, such as measles, may have a similar effect. I have also known a temporary lessening of the number of the attacks to follow a change of climate or more open air.

B.—Cerebral Disturbance due to Acute Disease in Organs other than the Brain.

1. *Digestive Causes.*

Indigestion of some kind accounted apparently for forty-six of my cases, and it is probable that a considerable majority of the cases of convulsions met with in young babies after the first fortnight is due to digestive derangements, either functional or organic. Fits are easily set up in infants who are debilitated by any kind of food disorder—especially by food intoxication with diarrhoea. When there is catarrh of the stomach with dilatation and retention of decomposing food, severe and repeated convulsions are common. This often occurs, for example, in cases of pyloric stenosis which are being unsuccessfully treated by medical measures.

In most cases of dyspepsia with convulsions the *treatment* consists in regulation of the diet—the "short cut" to recovery being the employment of a wet nurse.

In cases with gastric catarrh from prolonged retention of the stomach contents, washing out of the stomach at suitable intervals generally stops the fits at once.

2. *Jaundice.*

In two of my cases there was profound jaundice. In one of them its cause was obscure; the other was a case of congenital obliteration of the bile ducts.

3. *Genito-urinary Irritation.*

This is a frequent cause of severe nervous disturbance in babies, and sometimes gives rise to fits. If the urine is concentrated, highly acid and depositing uric acid crystals, as sometimes happens when a baby is taking too little fluid, high fever is not uncommon, and fits may occur. This was seen in two of my cases. In another the fits were apparently due to severe irritation from phimosis. In two cases the cause was genito-urinary infection with *Bacillus coli* (pyelitis or pyelonephritis). In infants over 6 months—especially in girls—this form of infection often causes rigors, and fits are rare. When the disease occurs in the early months of life, however, convulsions are much commoner than in older babies, and rigors rarely, if ever, occur.

4. *Acute Bronchitis or Bronchopneumonia.*

These accounted for six cases.

5. *Choroiditis; Otitis; Heart Disease.*

Choroiditis and otitis media seemed to be the causes in one case each, and congenital heart disease in two cases.

6. *Unknown.*

In seven cases no definite local lesion could be found, but there may probably have been some unrecognized source of reflex irritation.

C.—CEREBRAL DISTURBANCE CONNECTED WITH VARIOUS KINDS OF GENERAL INFECTION, OR WITH DEBILITY.

1. *General Tuberculosis.*

Fits are not uncommonly the chief symptom in the rare instances in which very young babies die of general tuberculosis. In these the infection often comes from a phthisical parent, and it usually starts in the respiratory tract. In three of my seven cases of this nature there were only a few convulsions. In the other four they were very numerous, and in this and in their other characters the symptoms somewhat closely resembled those met with in the "idiopathic" group. They were also usually checked for a time by the administration of chloral.

2. *Congenital Syphilis.*

In only 5 per cent. of the 200 cases did the children have evidence or a clinical history of syphilis. When we consider the large number of syphilitic babies seen in the early weeks of life and the frequency with which they are suffering from other causes of convulsions, such as severe dyspepsia and debility, it seems probable that a syphilitic taint has not in itself a very strong tendency to give rise to this symptom.

3. *Debility.*

In two of the cases nothing was found to account for the convulsions except extreme debility. They appeared as a terminal symptom.

4. *Whooping-cough.*

In the rare instances in which babies take whooping-cough in the early months of life fits are not infrequently met with. In these cases bromide has little or no effect, but the convulsions are generally stopped by the administration of chloral.

5. *The Idiopathic Convulsions of Early Infancy.*

The last type of convulsions to which I wish to direct your attention is one which has not received a special name, and for which no central, reflex, or other cause has as yet been discovered. We may therefore speak of these fits provisionally as "idiopathic convulsions." They generally occur during the early weeks of life; and they are not very common—for, in the last twenty-five years, I have only seen thirty-five cases in very young babies and two in rather older infants. They present, however, as we shall see, certain very interesting features, both in connexion with their treatment and with their possible etiology. Before dealing with the clinical features in more detail, the symptoms which occur in a typical case may be described shortly as follows:

Typical Case.—The patient, who is usually a boy, has been bottle-fed, and has hitherto seemed well in every respect. He has not suffered from any severe food disorder; there has been no reason to suspect the presence of a cerebral birth injury, and his mental condition has been normal. When two or three weeks old the child begins to have slight twitchings of the face and limbs, which recur at frequent intervals. These soon develop into regular convulsive seizures of short duration. After they have gone on for a day or two, the fits become very numerous—twenty to fifty in the day—and they may continue so for weeks, if the case is not successfully treated. During the short seizures the child is unconscious, and in the intervals he is usually drowsy.

The administration of bromide, even in full doses, has little or no effect in stopping the attacks; but if chloral is given cautiously and continuously in a sufficiently large amount, the fits not only cease rapidly, but do not return when the drug is discontinued; and the child grows up perfectly healthy in mind and body. There are reasons for suspecting that, if the treatment is not carried out effectively, the child's mental condition may be permanently damaged.

Details of the Clinical Features.

Sex.—A large majority of the patients were boys (25 : 10).

Family History.—In five of the cases there was a history of fits, or of great nervousness, in other members of the family. Three of the children were twins.

Character of the Labour.—Satisfactory details of the confinement were only obtained in a few instances, but, so far as could be ascertained from the mothers, the birth had been normal and non-instrumental in 19 of the cases. In 12 forceps had been used, but there had been little or no difficulty in any of these. The infant had shown signs of slight asphyxia at birth in three instances. Two of the births had been premature. In four cases no details were available.

Form of the Feeding.—In two of the cases this was not noted. In two others the children were on the breast, but it was almost certain that in both of these cow's milk had also been given. In the remaining 31 cow's milk, or some food made from it, was being regularly used. In no case had any connexion been noticed between a change of food and the beginning of the symptoms.

General Condition.—In two of the cases the child's general condition was not noted. One of the infants showed marked debility; in another the symptoms began during an attack of influenza. All the other patients (31) were said to have been in good health, and several of them were thought to have been above the average in vigour when the fits began.

Digestion.—In about half of the children there had been no indications of indigestion at all. In the others, slight dyspeptic symptoms, such as flatulence, occasional vomiting, loose motions, or constipation, were remembered by the mothers, but in no case had these been severe.

Onset of Symptoms.—The date of the first sign of the convulsions varied from the fifth day—in three instances—to the end of the twelfth week. (As I have already mentioned, I have seen two cases in which similar convulsions began later—in the sixth month in both instances. I shall not, however, include them here.)

Date of Onset of the Convulsions.

During 1st week in	6 cases	During 7th week in	3 cases
,, 2nd ,,	5 ,,	,, 8th ,,	2 ,,
,, 3rd ,,	7 ,,	,, 9th ,,	1 case
,, 4th ,,	4 ,,	,, 10th ,,	1 ,,
,, 5th ,,	2 ,,	,, 11th ,,	1 ,,
,, 6th ,,	2 ,,	,, 12th ,,	1 ,,

In most instances the earliest symptoms had consisted in a slight twitching of the face, arm, or leg, and this was usually unilateral at first; there was also some rigidity of the affected limbs in some of the children. These symptoms rapidly developed into regular short convulsions which soon became general, although they were often unilateral at first. After the first few days the character of the attacks remained the same, but their number increased

rapidly until there were often twenty to fifty, or even more, in the twenty-four hours. The period of unconsciousness accompanying the fits was very short, and the child was not noticeably cyanosed; but he generally remained somewhat drowsy during the intervals.

The *diagnosis* of this type of fits depends on the clinical features—short slight general convulsions, repeated at brief intervals, occurring in a child who has been born after a fairly natural labour, has seemed hitherto normal in body and mind, and has had no severe digestive derangement, and no other cause of reflex irritation sufficient to account for fits, and who makes a rapid and complete recovery under chloral.

Treatment.

Bromides, as already mentioned, are of no use. Chloral is very successful, provided it is given cautiously and in sufficient dos s.

The chloral is administered by the mouth, and the best dose to begin with is one grain every two hours. This almost always lessens the number of the convulsions, and sometimes stops them altogether. If they still continue a grain and a half must be given, and the dose may have to be increased to two grains every two hours for a short time in children of more than a month old. This dose cannot usually, however, be given for more than a few hours, as it soon makes the child too drowsy to swallow. When the fits have ceased for a day or two days the chloral should be given at increasing intervals—three, four, and six hours—and then gradually stopped.

In the large majority of cases, if no complication occurs, the child gradually awakes, his appetite returns, and he has no more fits, though he sometimes remains more or less drowsy for weeks. In eight of the thirty-five cases, owing, apparently, to the amount of the chloral given not being sufficient, the fits returned when the drug was discontinued. Sometimes they began again at once, and sometimes not for a week or two. In all but one of these, however, when the chloral was resumed, the fits ceased and did not return.

Result of the Treatment.—This was almost always most satisfactory, provided the necessary precautions had been observed. Of the thirty-five cases, one was lost sight of at once, three died rapidly of pneumonia, and two a month or two after apparently successful treatment; in neither of these were details of the fatal symptoms obtainable. Two of the children became mentally defective. Of the remaining cases—twenty-seven in number—fifteen recovered, but after doing well for several months were lost sight of. Of the twelve others, whom I have recently seen, or of whom I have lately heard details, two died from acute infectious illness in later childhood; and ten—whose present ages vary from 13 months to 24 years—have remained quite well in body and mind. None of them, so far as I have been able to ascertain, have ever had any more fits, and none have shown any symptoms of asthma, or severe indigestion, or any sign of an idiosyncrasy to ordinary articles of diet.

Dangers of the Treatment.

There are two dangers connected with the treatment by chloral. One of these is the risk of *inhalation-pneumonia* being set up if the child is carelessly fed while deeply under the influence of the drug. While taking the doses necessary to stop the convulsions, the baby has usually some difficulty in swallowing his milk, and when the maximum doses are being given this becomes greater. Great care must therefore be used in the feeding. If the mother or nurse is warned about this the feeding can usually, without difficulty, be carried out in such a way that no harm results. If, however, little care or skill are used the choking and spluttering which occur are very apt to result in some of the milk finding its way into the lung and setting up pneumonia. This occurred in 3 of my 35 cases.

The other danger which must be guarded against is of quite a different kind, and arises when the chloral is given in too small amounts. When this is done the drug may only depress the child's vitality without preventing injury to the brain cells by the toxin of the disease, and the damage done may permanently injure the child's mental condition. It can scarcely be claimed that this is proved by the experience of the two following cases, but it is at least a probable theory to account for the mental deterioration which resulted in them.

One of these children, who was a typical and severe example of the disease, did well at first in the usual way on the usual doses, and the fits stopped. The medicine was then promptly discontinued, whereupon there was a return of the convulsions, and they again became very numerous. Full doses were again ordered, but the fits continued to recur frequently and severely, and before long it was evident that the child's mental condition was gravely affected. After this no improvement took place, and the infant rapidly became quite idiotic, and remained so till she died some years later. The failure of the treatment in this case may have been due simply to its having been one of unusual severity from the beginning. It was, however, discovered after it was too late that, at the most important stage of the case, the nurse, owing to some misunderstanding, had been giving less than a third of the dose of chloral that was ordered.

In another well marked case, which was not so severe as this one, it was suspected that the full amount of the medicine ordered had not been given. The convulsions, however, stopped after a time, and the baby was reported to have made a good recovery. When I saw him again, seven or eight years later, he was found to be an imbecile of a mild grade, aud he is now in an institution for the mentally defective.

Etiology.

The causation of these cases is extremely obscure; but it certainly looks as if the convulsions were set up by the action on the brain cells of some sort of poison formed in the body. The most remarkable fact about the attacks is that in a large majority of the cases they are *permanently* stopped by a merely *temporary* chloralization of the patient. Any attempt to solve the problem of their causation must take this striking fact into consideration.

A search for some analogous phenomena which might possibly help to explain the action of the drug in these cases has only led to the discovery of one fact which seems to have a bearing on the question. This is the observation, described by C. Richet,[3] Besredka,[4] and others, that when a guinea-pig is put deeply under ether, alcohol, chloral, or certain other narcotics, before the second dose of a serum which is usually rapidly fatal, the expected anaphylactic shock is generally suppressed altogether, and after a period of unconsciousness the animal "awakes vaccinated," as Richet expresses it.

This phenomenon has been repeatedly observed by later workers, but I have not been able to find any printed statement as to how long the effect of the "vaccination" which follows has been found to continue. We must look to the laboratory workers to clear up the difficulties of the subject; certainly, as Besredka says, it seems to be "pregnant with possibilities."

There can be little doubt that the very interesting and as yet only partially understood process of anaphylaxis plays an essential part in the causation of some, and perhaps of many, morbid phenomena—especially in early life. There is, however, reason to suspect that too many symptoms are sometimes attributed to it. It therefore becomes those of us who have had no practical laboratory experience in such matters to speak of them with caution and diffidence. Perhaps, however, we may be allowed a little mild theorizing. The result of these experiments in guinea-pigs certainly suggests the question whether the clinical phenomena of this particular type of convulsions may not possibly be due to a peculiarly modified form of anaphylaxis, or some similar process, set up by the ingested cow's milk. While we do not as yet possess facts enough to enable us to answer this question in the affirmative, it may, I think, be fairly claimed that we have enough information to justify our saying that this is at least the most hopeful direction in which to look for an explanation of the facts.

Two somewhat different clinical types of severe acute poisoning from cow's milk, which apparently depend on anaphylaxis, may be met with in young infants, though fortunately they are both *extremely* rare. Of the most characteristic and least common of these, I have only had to do with one case.

Case.*

The patient was a female infant whose mother and sister were subject to similar symptoms. The mother, though otherwise healthy, had frequently suffered, during the four years

*I am indebted to Dr. R. A. J. Harper for the notes of this case.

before this baby's birth, from attacks of urticaria, local oedema, and hay fever after eating acid fruits or bananas, and had also once had severe asthmatic symptoms. One sister was subject to urticaria after eating bananas, and had had an attack of acute rheumatism. The other two sisters had shown no sign of idiosyncrasy to food of any kind.

During the first few months of life the baby, who was on the breast, had on several occasions had a meal of cow's milk without any bad effect. When seven months old she was given a little rice pudding with cow's milk, which was followed at once by urticaria and asthma. From that time on she had violent symptoms whenever she was given cow's or goat's milk in any form or raw white of egg. Half a teaspoonful of milk was sufficient to bring on an attack within a few minutes. The breathing became difficult and there was sneezing and coughing, with running of the eyes, rhonchi in the chest, and an urticarial rash. The baby seemed seriously ill and collapsed, and she remained so for two or three days. Once while she was on the breast she developed similar symptoms after her mother had eaten a banana, although the mother herself on that occasion was not affected. Cow's milk diluted in various ways, Glaxo, Cow and Gate milk, Nestlé's, Allenbury's, Benger's and other "infant foods," and also goat's milk, were all found to affect the child in a similar way. Peptonized milk did so also, but to a rather less severe degree. Raw white of egg caused the same symptoms, but the child could take boiled and fried eggs with impunity. With raw egg albumin she had also had diarrhoea and vomiting.

The baby was small but apparently healthy, and showed no physical signs of disease. She was fed, with some difficulty, on patent groats with water, boiled eggs, potatoes and other vegetables, fish, chicken, minced beef, gravy, and so on. When about eighteen months old she began to tolerate small quantities of cow's milk, and she has since, I understand, gradually improved.

The other type of case, though not often met with, is less uncommon, and many instances of it have been described.[5] The symptoms may set in within fifteen minutes, but are frequently delayed for one to five hours after the milk has been taken. They may be caused by even a few drops of it. The infant turns pale, drowsy, and uncomfortable, refuses food, vomits and has diarrhoea, with some degree of fever, or sometimes a subnormal temperature and collapse; and occasionally there is glycosuria or albuminuria. In these cases there is generally no sign of urticaria or of respiratory distress. The child rapidly recovers when put on breast milk only. Often the idiosyncrasy does not show itself for some weeks after birth; and in many cases it diminishes or ceases in the course of a few months, although in others it may last into later childhood. If the children are carefully looked after the condition is rarely fatal.

It is to be noted that none of my cases of "idiopathic convulsions," so far as I have been able to ascertain, has shown any subsequent tendency to convulsions, to food idiosyncrasy, to asthma, or to skin eruptions. Should it be shown that the above hypothetical explanation of these cases is possibly correct, the further question naturally arises as to whether, when symptoms of poisoning from cow's milk, white of egg, oatmeal, or other common foods occur in young children, they might not be stopped permanently if the patient were subjected to a thorough chloralization for some days, while continuing the offending diet; and even whether a tendency to asthma and eczema beginning in infancy might not be permanently arrested in a similar way.

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AN international congress for protection of mothers and infants will be held in Paris from July 6th to July 8th, 1922, when the following subjects will be discussed: (1) Protection of mothers before and during confinement; (2) protection of mothers during lactation; (3) protection of the infant separated from its mother; (4) assistance and instruction. Applications for membership should be made to La Ligue contre la Mortalité Infantile. 49, Rue de Miromesnil, Paris.

BILATERAL RIGIDITY IN MIDDLE MENINGEAL HAEMORRHAGE.

BY

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THE clinical picture presented by middle meningeal haemorrhage has received during the past forty years the attention of many skilled observers. Their labours have been so fruitful that in its most typical form the middle meningeal syndrome has the distinction of being one of the most clearly defined in the whole range of medicine. As is usually the case when the picture of a settled type of case becomes clear and easily recognized, the surgeon and the physician have an opportunity of noting with greater profit the variations from type which individual cases present. The frequency of the "free" or "lucid interval," the reasons for its absence, the occurrence and significance of ocular palsies and deviations, of paralyses of the limbs, of aphasia, and the incidence of Jacksonian fits, have all received their measure of investigation and have been allotted definite values.

Two cases recently under my observation presented certain features to which attention has not hitherto been specifically drawn in this connexion; in place of monoplegia or hemiplegia there was a very pronounced degree of general muscular rigidity. Here and there in the literature of middle meningeal haemorrhage a case is recorded in which it was noted that the limbs were rigid.

A bare half-dozen are to be found amongst Wiesmann's collection of 257 cases.[3] Further examples occur in Duret's comprehensive monograph,[4] but these include severe fractures of the skull, with cerebral laceration and intradural haemorrhage. These references are so incomplete that one gets only a hazy impression of the precise nature of the condition; the authors have simply recorded the fact in a few words without further comment.

In the histories which follow I have attempted to give a fuller account of the appearance and posture of the patient. The muscular fixation was seen to involve the trunk and all four limbs, and was such that passive alteration of position was difficult, and at times impossible, without the employment of considerable force. The clinical picture is so striking that, once seen, it is not likely to be forgotten. It seems to me to be important that attention should be directed to these generalized rigidities, and that the processes attending them should be accurately observed. Kinnier Wilson[1] has recently described a similar rigidity appearing in pathological circumstances other than those here described, so that one cannot say that the essential rigidity seen in my own two cases is in any way pathognomonic of middle meningeal haemorrhage. It is, nevertheless, important to note that hypertonicity and a peculiar attitude of body have been observed in these cases of meningeal haemorrhage no less than in the cases described by Wilson, since the one throws a ray of light, if an oblique one, upon the other.

CASE I.—*Fall on Head: Linear Fracture in Left Temporal Fossa: Middle Meningeal Haemorrhage: Bilateral Rigidity of Trunk and Limbs: Operation: Death: Necropsy.*

On March 25th, 1921, J. D., male, aged 37, a window cleaner by trade, was at work cleaning some first story windows in a stone courtyard. He lost his balance and fell head foremost to the ground. Being temporarily stunned he lay for a minute or two and then got up and walked home, a distance of a couple of hundred yards. He sat down for a little while, telling his wife that he felt rather shaken, but soon declared that he would go and fetch his ladder and pail. This he did, but on arriving home a second time seemed decidedly worse, and went and laid himself down. He went to sleep, but when his wife tried to rouse him some little time later she found it impossible to awaken him. From this time (perhaps one and a half hours after the accident) onwards he remained unconscious. Later in the evening he was admitted to the Salford Royal Hospital under my colleague Mr. Garnett Wright, who kindly asked me to see the case. On admission he was unconscious, restless, moving arms and legs freely, and inclined to be noisy.

Symptoms and Physical Signs.

When seen by me, seven hours after the accident, the picture had changed. He lay flat upon his back, the arms rigid and extended by the sides. The hands were half-clenched and the forearms hyperpronated, so that the backs of the hands were facing the outer aspects of the thighs. The legs were stiffly extended and the toes pointed downwards, the ankles being

strongly plantar flexed and slightly inverted. The muscular rigidity was so great that considerable force was necessary to bend the limbs. Any attempt to alter the position in which the limbs lay seemed to bring on an excess of tonic rigidity, a fine tremor then appearing. The patient's head was turned sharply to the left, as were the eyes; the neck was rigid and the chin a little lifted, but no opisthotonos appeared. Cheyne-Stokes breathing was present, and at the height of the noisy, rattling respiration the tonus was exaggerated, the arms becoming even more pronated and the legs more rigid and adducted, the foot remaining in extreme plantar flexion. In the quiet periods of respiration the muscle tonus appeared slightly to diminish. There were no "tonic fits," only exaggeration of the already severe spasticity at the height of the Cheyne-Stokes breathing, and on moving a limb passively. The left pupil was widely dilated. It was practically impossible to test the tendon reflexes. Ankle clonus was present on both sides, but had a small amplitude and was exceedingly rapid. The plantar reflex gave rise to a sharp and very quick extension of the great toe on either side without flexion of the other toes. Oppenheim's, Gordon's, Craft's, and Chaddock's reflexes were absent. The abdominal muscles were rigid, but a slight response followed stroking on the right side, but not on the left. During the whole period of observation the patient made no voluntary movement of any kind. The pulse rate was 60.

Diagnosis.

In view of the characteristic history, the conjugate deviation of head and eyes to the left and the large immobile left pupil, together with the obvious signs of cerebral compression, there was no difficulty in diagnosing a left-sided haemorrhage.

Operation.

Operation was carried out forthwith. An intermuscular temporal exploration of the left meningeal field revealed a crack in the anterior part of the temporal fossa, and beneath this a huge extradural clot. The area of the clot was estimated at 12 cm. in diameter and nearly 4 cm. in depth at its thickest part. The clot lay over the left frontal lobe, and had extended forwards and upwards rather than backwards. The spurting middle meningeal artery was clearly seen, but was ligatured with some difficulty after extensive removal of bone. After the removal of the clot the brain failed to expand again although it pulsated freely, and when last seen only a slight elevation of the cortical surface had occurred. The dura was not opened. The wound was dried, drained, and sutured.

At the completion of the operation the rigidity was found to have disappeared, but the patient's general condition was desperate; the pulse had risen to 128 and the respiration was rapid and shallow. Death occurred three hours later.

Necropsy.

At autopsy no further point of any note was discovered. The brain was intact, no intracerebral haemorrhage was present, and indeed there was no trace of blood within the dura.

CASE II.—*Fall on Head: Compound Depressed Fracture of Right Frontal Bone: Left Middle Meningeal Haemorrhage: Bilateral Extensor Rigidity of Trunk and Limbs: Operation: Death: Necropsy.*

On May 12th, 1921, J. F., aged 26, male, fell head foremost off a roof 60 ft. high to the ground. On admission to the Salford Royal Hospital, within an hour of the accident, he was conscious and related the particulars of his fall. His temperature was then 97.5°, and his pulse 68. There was no paralysis; he could move all his limbs, and turned over on to his back at request. He was bleeding from the nose and from both ears, and presented a contused wound over the right frontal bone some 8 cm. long. An hour later he became drowsy and vomited, and shortly afterwards had a tonic seizure, his breathing at the same time becoming noisy. He was seen by me three hours later.

Symptoms and Physical Signs.

He was then deeply unconscious; the pupils, of medium size, did not react to light. He presented bilateral extensor rigidity of both legs, which were strongly adducted. The feet were in full plantar flexion, inversion, and supination. Every three or four minutes the tonic contraction of the limb became more pronounced, so that the employment of moderate force was insufficient to separate the thighs. In the intervals between the attacks the limbs were considerably less rigid, so that the legs could be pulled apart and the knees bent, but at no time was there flaccidity, at no time was there an absence of resistance. The left arm during the spasmodic attack was extended stiffly by the side in slight abduction, the wrist was strongly flexed and adducted. The fist was nearly, but not quite, closed and the thumb adducted across the palm within the fingers. The right arm presented a slightly different picture. It was held rigidly bent at the elbow at an angle of 130 degrees the wrist fully flexed and the hand as on the other side. During the tonic seizures both arms rotated inwards into a position of hyper-pronation so that the backs of the hands were directed towards the thighs. On the right side this was largely accomplished by an internal rotation at the shoulder-joint, the elbow remaining in partial flexion. On the left side, where the whole arm was stiffly held by the side, there was extension and internal rotation of the shoulder aided by pronation in the fore-arm. An attempt to interfere with the limbs during a tonic attack had little effect, and the muscular contraction was so strong that great force was necessary to restrain the movement or correct the position assumed by its agency. As in the other case, the tonic attacks were closely bound up with a change in the rate and amplitude of respiration. At the height of the attack respiration was rapid, noisy, and deep. As far as one could see, the sequence of events was, first, a change in respiration; next, twitching of the fingers on both sides, which ceased in a few moments to give place to an immobile rigidity; thirdly, there occurred flexion of the wrist and then inversion of the arms, the legs and trunk at the same time stiffening into extension. During a few of the seizures the patient arched his back in opisthotonos, affecting particularly the lower part of the spine. The head was not seen to retract nor to rotate. There was no incontinence. Ankle clonus was rapid and sustained; plantar stimulation led to a bilateral great toe extension, which was very rapid on the right and slower on the left.

Operation.

I operated upon the patient under local anaesthesia. The necessary shaving of the head had been accompanied by an almost constant state of tonic rigidity, and the introduction of the needle for novocain-adrenaline infiltration caused another attack. It seemed as if this condition of extreme muscle tonus was the only method that he had of responding to a stimulus, and took the place of defensive reflex movements. The frontal wound was excised and a large horizontal depressed fracture exposed, the bone being driven in and jammed. The depressed portion was rapidly elevated and removed, over an area some 8 cm. by 4 cm. up to the mid-line. At the inner end of the wound a small piece of dark clot was seen overlying the anterior end of the superior longitudinal sinus. A small piece of ribbon gauze was placed over this, the wound washed well with flavine and the dura widely incised as clinical signs of compression had been so severe. Exploration of the right meningeal field revealed no haemorrhage, but a search with a silver brain spatula over the right orbital plate disclosed comminution with loose bone fragments within the dura. The wound was loosely sutured up, with the intention of performing a secondary suture in three or four days when the acute stage was passing.

At the completion of the operation the patient was flaccid, phonating with expiration, and seemed better. His pulse, which had risen to 120 at the commencement of operation, fell to 70 after opening the dura. It remained afterwards steady at 76. The noisy and stertorous breathing had ceased and the tonic seizures had passed away.

He did well for an hour or two, but his pulse rose again later in the evening, and he died seven hours after operation without again exhibiting rigidity.

Necropsy.

At necropsy an extension of the fracture was found over the left frontal bone, which was very badly damaged. To my great chagrin a large middle meningeal haemorrhage was present on this side. It was anterior in position, and indeed extended so far forward that its anterior end had actually been seen in the wound. In size it approximated to that of a man's fist, and lay over the frontal pole of the left hemisphere. The right orbital plate was broken to pieces, and there was a superficial laceration of the under surface of the corresponding frontal lobe. There was no abnormality elsewhere in the brain and but little blood free within the dura.

It has been seen that the lesions responsible for the occurrence of the rigidity in these cases were in both left-sided extradural haemorrhages of considerable size occupying Kroenlein's position 1.[2] In one case there were serious associated injuries of the right frontal pole. Both patients were profoundly unconscious, were in a state of severe cerebral compression, and exhibited Cheyne-Stokes breathing at the height of which the muscular rigidities were brought out at highest pitch.

I have described the tonic conditions in these cases in detail because the question of generalized muscular rigidities has gained considerably in importance from Kinnier Wilson's valuable contribution to the subject. In my own cases, so closely corresponding in their clinical pictures to his, the rigidities must have been dependent on changes in the intracranial circulation produced by the extravasations or injury. It is inconceivable that the rigidity could have been the result of a local irritation of a neural mechanism by the action of the clot on the immediately underlying cortex. I am led to the belief that the clinical syndrome depends on a relative deficiency or the reverse of the blood supply to certain regions of the brain, and that this releases lower neuronic levels. The relationship between the crises of rigidity and those of Cheyne-Stokes breathing bears out the circulatory theory of their origin. And it is only by the mediation of some great common factor such as the quantity and quality of blood supply and the variations in this supply, local and general, occasioned by lesions of varied types, that we can correlate the several dissimilar intracranial maladies capable of producing bilateral rigidity.

The term "decerebrate rigidity," though convenient, is apt to suggest that the lesion producing it must be situate about the mid-brain—that the rigidity in man is the outcome of a pathological process which is the counterpart of an actual section at the colliculi in animals. These cases of mine demonstrate clearly that the level is a physiological rather than an anatomical one, and I have refrained from applying the term "decerebrate" to the rigidities in order that this significance should not be obscured.

Why generalized rigidities should make their appearance in one case and not in another of very similar gross pathology is a delicate question. It is probable that the syndrome in man depends on a very fine circulatory balance, on a relative anoxaemia sufficient to suppress cortical control but not great enough to render inactive the causal mechanism in mid- and hind-brains. Generalized rigidity may thus never have an opportunity of arising in one case; it may be but a phase in another (as Kinnier Wilson points out); whilst in a third, where the balance is maintained for a period, the rigidities may border on chronicity.

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METATARSUS VARUS.

BY

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METATARSUS VARUS is a deformity which has long been familiar clinically to orthopaedic surgeons, but it is not described even in textbooks of orthopaedic surgery, and its essential pathology has not yet, I think, been recognized.

Whitman,[1] it is true, makes passing reference to "metatarsus varus" as an incomplete form of clubfoot (congenital talipes equino-varus) or simple talipes varus, and the treatment recommended is the same as that for the varus part of congenital clubfoot.

But metatarsus varus belongs to quite a different category from clubfoot or talipes varus. It is not a contracture deformity at all. It is an anatomical deficiency deformity, and is due to congenital absence of the internal cuneiform bone. It should therefore be classed not with talipes or other congenital contractures, but with those conditions in which deformity is incidental to gross structural defect—for example, congenital absence or deficiency of the tibia, fibula, radius, ulnar, vertebrae, etc.

Clinically, the posterior part of the foot presents a normal appearance. There is no limitation of movement at the ankle or subastragaloid joints. There may even be some eversion (valgus) of the foot at the subastragaloid joint. The anterior part of the foot is sharply adducted at the tarso-metatarsal joint, but there is no inversion of the sole. The patient, therefore, stands with the sole of the foot fl t on the ground, but while the posterior part of the foot is straight, the anterior part is directed inwards or forwards and inwards. The great toe is usually adducted more than the other toes (hallux varus). There is a sharp kink, which can be both seen and felt, in the inner border of the foot, just behind the base of the first metatarsal bone. The patient can walk, but his gait is awkward, and the deformity is unsightly. So far as I know, the condition is always bilateral.

It should be noted that the displacement of the anterior part of the foot is entirely abnormal—it is not even, as in talipes, an exaggeration of a normal displacement. Adduction without inversion is not a physiological movement of the foot.

Radiography shows the adduction of the anterior part of the foot, but it does not reveal the essential defect in young children, because the cuneiform bones are not ossified at the age at which these cases usually come under observation. I have not had the opportunity of examining a patient who has grown up with this deformity.

In six feet (of three patients) that I have examined at operation the internal cuneiform bone was absent and represented by a flat disc of fibro-cartilage between the base of the first metatarsal bone and the scaphoid. The tendon of the tibialis anticus divided into two distinct slips, one of which was inserted into the fibro-cartilage, and the other into the base of the first metatarsal. It was not possible at operation to make out the condition of the middle cuneiform bone. The first metatarsal was shorter than normal and strongly adducted. The scaphoid was normal. In one case the neck of the astragalus appeared to be unduly long, and the head was bent downwards.

Treatment.

From the nature of the deformity it is obvious that the treatment suitable for talipes varus or the varus part of talipes equino-varus is quite inappropriate for metatarsus varus, and the general experience of orthopaedic surgeons is that the results of such treatment are unsatisfactory. It is true that a considerable amount of apparent correction can be brought about by manipulation and fixing the foot in plaster. But the correction thus obtained is not permanent, and the deformity always relapses more or less completely.

Anatomically the inner border of the foot is too short, owing to absence of the internal cuneiform bone, while the outer border is relatively too long. Permanent correction, therefore, can only be obtained either by lengthening the inner border or by shortening the outer. Two procedures, therefore, suggest themselves: (1) Separation of the first metatarsal and scaphoid bones, and the insertion of a graft to keep them apart; and (2) excision of bone—for example, the cuboid—from the outer border of the foot.

I have tried both these operations with, in each case, immediate correction of the deformity, but they are too recent to speak yet of the ultimate results. Theoretically, to replace the missing bone by a graft, and thus to restore the inner border of the foot to its normal length, would appear to be the ideal method of correcting the deformity. But I doubt very much whether this can be attained in practice. In the first place, the results of bone grafting, excellent as they are in very many conditions, are notoriously uncertain in cases of congenital bone deficiency. In the second place, if a fixed graft is successfully inserted into the first metatarsal and the scaphoid, and perhaps also the astragalus, it is likely that the rigid foot produced will eventually prove to be a greater disability than the original deformity.

For these reasons I think that the better practice is to remove bone from the outer side of the foot—a practice, be it noted, that is absolutely contraindicated in cases of clubfoot in young children. By removal of the cuboid the outer border of the foot is shortened and the metatarsus is abducted and brought into line with the posterior part of the foot. This, so far as my observations go, gives the best correction of the deformity with the least disturbance of function.

REFERENCE.

[1] Whitman, *Orthopaedic Surgery*, 1919.

TWO CASES OF PERNICIOUS ANAEMIA WITH INFECTIVE FOCI IN THE ALIMENTARY TRACT.

BY

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MUCH has been written on the etiology of pernicious anaemia, and the clinical evidence points to there being an invasion of some part of the alimentary tract by pathogenic organisms in a large percentage of cases. In the two following cases there appears to be very definite evidence of either past or present pathological changes in the alimentary tract.

CASE I.

The first case was that of A. B., aged 38, a trained nurse, who came under our care on April 8th, 1921. The history of the illness was that in July, 1920, she felt very "run down," and had to give up nursing. About a month later she noticed that

her skin and mucous membranes were pale. Amenorrhoea lasted for five months during the summer of 1920. No treatment beyond rest was adopted at this time.

In March, 1921, she felt sufficiently well to begin nursing again, but became ill again after three weeks' work. There was nothing of any importance in the family history. She had an attack of colitis nine years previously. Most of her teeth had been extracted, but she had a good artificial set with a few sound teeth of her own. No glossitis was present. She was very weak and pale; she had no other abnormal signs or symptoms, but the temperature was 100.2°.

On April 12th the result of a blood count was: Erythrocytes 1,232,000; leucocytes 1,750; haemoglobin 20 per cent.; polymorphs 53 per cent., eosinophils 1 per cent., lymphocytes 45 per cent.; colour index 0.85.

Marked poikilocytosis and anisocytosis were present, with a preponderance of microcytes. Moderate polychromatophilia and some basic stippling were observed. Two nucleated reds, both megaloblasts, were seen while counting two leucocyte films.

She was given novarsenobillon, 0.2 gram, intravenously, and the oral administration of beta naphthol, 5 grains twice daily, was commenced. Up to April 13th she had regular normal actions of the bowels, but after that date they were never open again except by enemata. The temperature rose, with morning remissions, until it was 104.4° on April 14th, falling by lysis until it reached 96.6° on April 21st. On April 14th cultures were sown from a catheter specimen of urine and a specimen of faeces. The former showed the *Staphylococcus albus* only, the latter *B. coli* only. On April 15th the patient became delirious and lay in a semi-conscious condition. On April 19th novarsenobillon, 0.1 gram, was given by intramuscular injection. On April 22nd her temperature was still subnormal, so half a pint of citrated blood from healthy and compatible donors was given intravenously. She recovered consciousness for about an hour, but her temperature again rose, and she died on April 25th, 1921.

The autopsy showed the following pathological changes. "Tabby-cat striation" was present on the columnae carneae of the heart. The liver showed fatty change, and excess of iron was present. The kidneys showed fatty degeneration, their surfaces were finely granular, and the capsules adherent.

The appendix was empty, with an apparently congenital occlusion of the lumen at its proximal end. About five feet above the ileo-caecal valve there was a sharp line of demarcation in the interior of the small intestine, but no constriction was present. Above this line the appearance was that of normal jejunum, below it normal ileum. The appearance at this place was as if an end-to-end anastomosis had been performed, but the patient had never undergone an abdominal operation. The line itself appeared to consist of a fine ring of small ulcers. Microscopic sections showed a simple ulceration of the mucous layer, the other layers being normal.

A section of the spleen showed slight fibrous change, with atrophy of the Malpighian tufts. Films of bone marrow showed some hyperplasia of the erythroblastic elements.

CASE II.

The second case was that of C. D., aged 58, a coachman. He came under our care on January 15th, 1921, with a history of diarrhoea and vomiting during the past seven weeks, accompanied by slight jaundice during the earlier part of that period. His past history was that he had two attacks of influenza about fifteen years previously, a severe attack of diarrhoea four years previously, followed by occasional milder attacks.

His appearance was cachectic and his mucous membranes were very pale. His teeth were dirty, but seemed sound otherwise. Emphysema of the lungs almost obliterated the cardiac dullness. Some scabbing was present in the right nostril, and a small polypus was found at the anterior end of the middle turbinal bone. This gave rise to a clear mucous discharge which was sterile. A blood count was taken on January 17th, with the following result: Erythrocytes 1,240,000; leucocytes 4,400; haemoglobin 35 per cent.; polymorphs 20 per cent., eosinophils 0, lymphocytes 80 per cent.; colour index 1.4. Marked poikilocytosis, extreme anisocytosis, and an abundance of macrocytes were observed. Seventeen nucleated reds, including five megaloblasts, were seen. Most of the reds showed nuclear remains. The patient was given haemoglobin and malt, 1 drachm thrice daily, also beta naphthol 5 grains twice daily. He started weekly intravenous doses of novarsenobillon 0.2 gram. The following pathological tests were made: Wassermann, negative; faecal examination, excess of fatty crystals; faecal culture, coliform bacilli and Gram-positive diplococci; urinary culture, a few sarcinae.

A blood count on February 3rd showed some improvement: Erythrocytes 1,528,000; haemoglobin 46 per cent. On February 16th the count was worse than the original one. This was attributed to a somewhat severe reaction after each dose of novarsenobillon. The dose was reduced to 0.1 gram, which produced no untoward symptoms, and has been gradually increased to 0.2 gram, which is being given at the present time. By April 8th he was again improving: erythrocytes 1,776,000. On April 4th an *x*-ray examination showed that the fangs of the lower lateral incisors were rather bulbous. These were extracted under a general anaesthetic with special antiseptic precautions, and yielded a pure growth of streptococci. A course of autogenous vaccine was given until June 13th, followed by a course of stock streptococcal vaccine. On June 28th the count was as follows: Erythrocytes 3,216,000; leucocytes 5,600; haemoglobin 65 per cent.; polymorphs 22 per cent., eosinophils 2 per cent., lymphocytes 76 per cent.; colour index 1.0. Fairly marked poikilocytosis and polychromatophilia. Six normoblasts, no megaloblasts.

The patient now enjoys good health, having the novarsenobillon and vaccine weekly. Time alone will show whether this is genuine recovery or a remission.

The points which we wish to emphasize about these two cases are the history of colitis in the first case and of diarrhoea in the second. In the first case a definite ring of ulcers was found in the intestine, and in the second an infective focus in the teeth. Novarsenobillon seems to be a valuable drug in this disease; the value of the autogenous vaccine cannot be estimated as it was given concurrently with other treatment. Evidence of alimentary derangement was also present in a fatal case of pernicious anaemia following dysentery which we treated in 1920. There was a history of alimentary derangement in a case of aplastic anaemia and a case of pernicious anaemia which Dr. Rivaz Hunt has kindly allowed us to quote. The latter appears to be enjoying normal health under treatment with novarsenobillon.

EIGHTY-NINTH ANNUAL MEETING
OF THE

British Medical Association.

Held at Newcastle-on-Tyne, July, 1921.

SECTION OF PHYSIOLOGY, PHARMACOLOGY, THERAPEUTICS, AND DIETETICS.

H. H. DALE, C.B.E., M.D., F.R.S., President.

BEFORE proceeding to the business of the Section, Dr. H. H. DALE and Professor A. V. HILL gave two eloquent appreciations of the work and character, both as a physiologist and as a man, of the late Professor J. A. Menzies, Vice-President of the Section, who died only a few days before the opening of the Annual Meeting of the Association. It was decided that a resolution expressing the "deep sense of the loss medical science has sustained by the death of Professor James Acworth Menzies, Professor of Physiology in this University, and Vice-President of this Section," should be conveyed to the University, and that in addition a message of respectful sympathy should be sent to Professor Menzies's widow.

THE USE OF THE HOT WIRE FOR INVESTIGATING THE TIME RELATIONS OF THE PULSE AND THE CHARACTERISTICS OF VOLUNTARY CONTRACTION IN MAN.

BY

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[*Abstract of Communication.*]

A VERY fine platinum wire (of diameter about one-hundredth of a millimetre) is mounted in a tube which is connected to a tambour or funnel placed upon the subject's artery. The wire is heated to just below redness by an electric current. The rise of temperature in the wire raises its electrical resistance, which, however, is lowered each time a pulse of air comes along the tube and cools the wire. The pulses of air caused by the movements of the artery, therefore, cause corresponding changes in the resistance of the wire, and a continuous record of the latter is therefore also a continuous record of the movements of the artery. The electrical resistance of the wire may be recorded in one of three ways:

1. By a Wheatstone's bridge arrangement and a string galvanometer. The hot wire is placed in the fourth arm of the bridge and the other resistances are so adjusted that no current passes through the string galvanometer, and therefore the string is not deflected. When the resistance of the hot wire changes, the balance is upset and

a current passes through the string, the deflection of which is recorded upon a moving photographic plate.

2. By having the hot wire in the primary circuit and the string galvanometer in the secondary of an electrical transformer. When the resistance of the hot wire changes there is an alteration in the intensity of current passing through the primary, and this causes an induced current through the galvanometer, which is recorded in the same way.

3. By a similar condensor arrangement.

The principal advantages of the instrument are that there is extraordinarily little time lag between events taking place at the artery and the corresponding movement of the string; that the time relations of the pulse can be very accurately measured, and that the records are not contaminated by artificial effects due to independent mechanical vibrations of the recording instrument itself. Vibrations of this kind can be detected in tracings, obtained by the usual mechanical methods, by comparing them with records obtained in this way. The velocity of the pulse wave can be measured very accurately by means of two hot-wire sphygmographs, one of which is placed on the carotid pulse, the other on the radial. If generally required for this purpose it would be possible to replace the costly string galvanometer by a much cheaper arrangement.

The same apparatus can be modified so as to record the movements of human muscles when contracted voluntarily. A convenient way to show the effect is to hold a tambour between the first and second fingers and to press on its surface with the thumb. Whether the tambour is pressed gently or vigorously the photographic records show oscillations varying from 40 to 50 per second. Different subjects give different frequencies of oscillation, but the same subject gives a frequency which is constant and independent of the particular instrument used. From these and other control experiments it is argued that the oscillations observed do not owe their origin to independent vibrations of the instrument itself. When the tongue is pressed against the tambour, oscillations of the same characteristic frequency are again observed. This eliminates the possibility that they may be caused by mechanical creaking at joints. The frequency of oscillation corresponds closely with the frequency of the electric change in voluntary contracting muscle observed by Piper.

The nature of these records, and of the Piper electromyograms, suggests tentatively an interesting property of the cells which constitute a centre in the nervous system. These must discharge their impulses at the same frequency and in the same phase as one another; otherwise the muscular contraction and the electrical variation would both inevitably be continuous instead of periodic. Moreover, according to the all-or-none law, when a muscle enters into moderate contraction a certain number of its fibres contract fully, whilst the remainder continues entirely passive. The absence of fatigue in a moderately contracting muscle suggests that if a moderate contraction is prolonged, the first group of active fibres is relieved by a second group which up till then have been passive. After a further interval the second group is in its turn relieved, and so on. Records obtained during health suggest that the transition from one group of fibres to another occurs quite smoothly, but that in old age, fatigue, and possibly in functional diseases of the nervous system, it cannot be accomplished so accurately, and tremors appear.

DISCUSSION.

Dr. MARTIN suggested that the application of the hot-wire sphygmograph to the investigation of cases of aneurysm would prove very fruitful.

Dr. G. A. CLARK suggested that it might be possible by this method to follow the passage of the contraction wave down the auricle.

Dr. H. H. DALE reminded Dr. Clark that Lewis had already succeeded in doing this by attaching a set of hairs to the auricle. It would be well to reinvestigate by this method Sherrington's work on the relative strength of the muscular contraction induced (*a*) by direct stimulation, and (*b*) by reflex stimulation. He pointed out to Dr. Martin that many hospitals possessed an electrocardiographic instalment which could be easily modified to this purpose, and, further, that the method would be a very convenient one for the bedside.

Professor A. V. HILL pointed out, in reply to Dr. Martin, that variations of temperature in the rubber tube connecting the tambour to the hot wire had no appreciable effect upon the records, and that of the three methods described in the paper he had found the Wheatstone bridge most satisfactory. In reply to Dr. Dale, he considered that adventitious sounds in the room where observations were being made would not affect the records at all.

THE ETIOLOGY AND TREATMENT OF VARICOSE ULCERS.

BY

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AND

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Beit Memorial Research Fellow.

THE causation of varicose ulcers is generally regarded as due to a local depression of tissue resistance in the region of the affected veins, dependent on a local nutritional deficiency. The treatment is usually purely local, consisting of such mechanical means as bandaging, or of the external application of stimulant lotions or ointments, in order to promote tissue growth and repair. In the series of cases under consideration a new aspect of the pathology of this condition is put forward, and also a means of procuring satisfactory results by treatment in a relatively short time. With one exception all the cases were varicose conditions, either ulcers or eczema; the remaining case was that of an old wound of the leg which had broken down and ulcerated.

In a previous paper, published in the *Journal of Physiology*,[1] it has been shown that the calcium of normal unclotted blood is present in two forms; of a total of 10.7 mg. p.c., roughly 4 mg. are present in a combined or non-ionized form, and 6.7 mg. are present in the ionic state. After clotting has taken place, the total ionized calcium was found to be 10.7 mg. p.c., so that normally all the calcium of the serum should be ionized. In all the present cases it was found that there was a deficiency in the ionized calcium, though the total calcium was not very markedly reduced. The inference to be drawn, therefore, is that some of the calcium which should be ionized has become combined with some unknown substance, formed at some stage of the pathological process in question. It suggests, further, that the ulceration may be due to this deficiency of the ionized calcium, and treatment was therefore directed towards supplying the deficiency.

The first form of treatment used was the intramuscular injection of calcium chloride dissolved in distilled water, 1 grain being injected once a week, or in some cases at shorter intervals. Details of this method of treatment will be found in a paper on the use of calcium salts in haemorrhage.[2] The results obtained were not satisfactory, and only one complete cure was obtained in these ulcer cases. A tolerance to the calcium injections appeared to become established, so that progress was only obtained by increasing the amount and frequency of the dose. Improvement or retrogression of the ulcer ran roughly parallel with the rise or fall of the ionized calcium content of the blood. To summarize, this form of treatment was beneficial up to a certain point, but required considerable time and patience, and even then its results were by no means certain.

The second form of treatment used was the combination of calcium injections with the oral administration of thyroid gland substance. This produced effects which were not markedly different from those obtained with the injections alone. It cannot be said that the thyroid had of itself any beneficial effect. In one or two cases calcium salts given by the mouth were substituted for the injections, but the effect was not only entirely negative in respect of improvement, but even harmful.

Parathyroid gland substance (Parke, Davis), gr. 1/10 by the mouth daily, was next used, and with this treatment an

immediate improvement seemed to take place. The ionized calcium of the serum rose rapidly to the normal figure, and the local condition showed early signs of healing; it was found unnecessary to continue the calcium injections. In cases treated with parathyroid alone seven to fourteen days seemed to be the period required for the drug to produce its maximal effect, though the time taken for complete healing to occur was of course dependent on the size of the ulcer. In putting this treatment into practice, gr. 1/10 of the parathyroid substance is given daily until healing has occurred, and then twice a week for three or four weeks. In this series of cases, and also in other cases, no signs of overdosage became evident, even though the patient was taking parathyroid for several weeks without intermission. When firm healing has occurred the patients are told to report at once any irritation round the site of the ulcer, and if the ionic calcium is again decreased a further short course of parathyroid may be prescribed.

The local treatment of the ulcers was of the simplest type, in order not to prejudice the action of the internal treatment. The ulcers were covered with plain gauze or boracic lotion, though in some cases no dressing at all was used. It must be remembered that the calcium deficiency is but one factor in the condition, and that for the maintenance of efficient tissue nutrition, and therefore healing, the circulation and drainage of the part must be assisted. It was for this reason found that the best results were obtained when the patient was kept in bed; if cases are allowed to go about their usual business healing is very much retarded, and as the parathyroid also relieves the pain and irritation of the affected part, the ulcers are neglected and may become grossly infected. Again, the best results are obtained with early cases of ulceration or varicose eczema rather than with long-standing ulcers, where local fibrosis has interfered with the blood supply to the ulcerated area. It was found that early cases treated with parathyroid and confined to bed healed up with quite remarkable rapidity.

The fact that parathyroid administration has so great an effect in causing these ulcers to heal seems to point to the possibility that a partial deficiency of the parathyroid secretion may play some part in their causation, and this supposition is strengthened by the fact that the parathyroids are recognized regulators of calcium metabolism. The true reason for this failure of parathyroid activity must be a matter of conjecture. It is possible that two factors play a part: first, that varicose ulcers commonly occur in middle-aged patients, especially females, at a time when degenerative changes are most apt to become evident; and, secondly, that the continued stagnation of the blood in a chronically varicose area may produce in time a general poisoning, as such blood must be overloaded with the products of tissue breakdown.

It may not, therefore, be unreasonable to suggest that varicose ulceration is another instance of the vicious circle in disease. The toxic agents produced by the varicose condition may be supposed to affect the parathyroid glands, and are also able to combine with some of the calcium of the blood which is normally ionized. The calcium balance of the blood is thus disturbed, and the damaged parathyroids are unable to readjust it. This deficiency of ionic calcium may cause a lowering of vitality of the tissues, so that chronic ulceration or eczema occurs at the point where nutrition is worst. Ulceration leads to a further absorption of toxic material, and so the circle is completed. The aim of treatment is to break it; calcium alone seems unable to do so, probably because it is only able to affect the particular symptom of calcium deficiency, and does not act upon the primary cause—an erring metabolism. Parathyroid, on the other hand, has apparently a more fundamental action: not only can it act specifically upon the calcium metabolism, but it may also produce an improvement in the general metabolism through the medium of the endocrine system as a whole.

It is not yet possible to state that all chronic non-malignant ulcerative processes are of the same type. It has, however, been found in the small number of cases examined that chronic gastric ulcer conforms to the same type of calcium deficiency. Further, such cases are undoubtedly improved by the administration of parathyroid substance, so that there are indications that two chronic ulcerative conditions, differing widely in locality and in the symptoms they produce, may yet have a common biochemical relationship.

Case 1.—Female, aged 45; varicose ulcer. Before treatment the ionized calcium content was 6.19 mg. p.c.; on the seventh day of treatment by injection of $CaCl_2$ gr. 1 it was 6.93 mg. p.c.; on the thirteenth day 7.23 mg. p.c.; and on the twenty-seventh day 10.58 mg. p.c. On the forty-first day the ulcer was completely healed. Four months later it was still healed; some irritation of ankle. Ionic calcium = 8.66 mg. p.c.

Case 2.—Female, aged 55; extensive ulcer encircling leg completely. The progress of the case is shown in the following table:

Day of Treatment.	Treatment.	Ca mg. p.c. Serum. Combined.	Ionic.	Total.	Progress.
0	Before treatment	—	4.83	—	
7	$CaCl_2$ inject. gr. 1	—	6.06	—	Improved.
15	" "	—	5.38	—	Healing.
21	" "	—	8.07	—	
29	" "	—	6.06	—	
36	Injections stopped	—	7.74	—	
43	——	—	8.47	—	
50	——	—	7.74	—	
57	——	—	6.90	—	Enlarging.
81	$CaCl_2$ gr. x per os t.d.s.	—	5.22	—	Spreading.
88	Inject. recommenced	—	5 70	—	
92	——	—	6.33	—	
104	——	—	6.61	—	Slow improvement.
113	$CaCl_2$ per os stopped	—	6.01	—	Stationary.
123	$CaCl_2$ gr. 2 inject. (on 118th day)	—	6.93	—	
127	" "	2.08	6 93	9.01	
133	" "	3.01	6.01	9.02	
138	" "	2.05	6 62	8.67	Eczema.
145	" "	1.65	6.01	7.66	
153	" "	2.39	6 62	9.01	
166	$CaCl_2$ gr. 2; and thyroid gr. 2½	2.47	6.62	9.09	
172	" "	3.24	5.77	9.01	
179	" "	3.26	5 77	9.03	
185	" "	2 48	7.32	9.80	
194	" "	2.08	7.70	9.78	Eczema gone.
201	$CaCl_2$ and parathyroid gr. 1/10	0 94	8.66	9.60	
208	Parathyroid only	—	10.1	10.1	Healing.
215	" "	—	10.4	10.4	
223	" "	—	10.4	10.4	

Completely healed on the 237th day.

Case 3.—Female, aged 42. Treatment and progress:

Day of Treatment.	Treatment.	Ca mg.p.c. Serum. Combined.	Ionic.	Total.	Progress.
0	Before treatment	3.44	6.01	9.45	
4	$CaCl_2$ inject. gr. 1	3.00	6.01	9.01	
10	$CaCl_2$ inject. gr. 2	1.68	7.35	9 03	Healing.
15	" "	1.29	6.98	8.27	
22	" "	0.48	9.45	9.93	
30	" "	0.48	9.45	9.93	
43	" "	—	9.92	10.10	
49	$CaCl_2$ and thyroid gr. 2½	1.00	8.66	9 66	Stationary.
56	" "	1.78	7.70	9.48	
63	" "	1.36	8.44	9 80	
71	" "	1.39	7.61	9.00	
78	$CaCl_2$ and parathyroid gr. 1/10	2.06	7.70	9.76	Healing.
85	Parathyroid only	—	10.1	10.1	Healed.
100	" "	—	10.4	10.4	

Case 4.—Male, aged 58. Treatment and progress:

Day of Treatment.	Treatment.	Ca mg. p.c. serum. Combined.	Ionic.	Total.	Progress.
0	Before treatment	3.50	5.51	9 01	
7	$CaCl_2$ inject. gr. 1 and thyroid gr. 2½	3.08	6.01	9.09	
10	Ditto	2.28	6.35	8.63	Slow improvement.
21	Ditto	3.18	6.30	9.48	
28	Ditto	1.54	8.26	9.80	
35	Ditto	1.65	7.35	9.00	
41	Parathyroid only, gr. 1/10	1.14	8.26	9.40	Stationary
49	" "	—	10.1	10.1	Rapid improvement.
56	" "	—	10.4	10.4	
64	" "	—	10.4	10.4	

Case 5.—Male, aged 30; old wound of leg, broken down and ulcerated. Treatment and progress:

Day of Treatment.	Treatment.	Ca mg. p.c. Serum.			Progress.
		Combined.	Ionic.	Total.	
0	Before treatment	2.89	5.75	8.64	
13	$CaCl_2$ inject. gr.1 and thyroid gr.2½	2.13	7.35	9.48	
18	Ditto	2.66	6.35	9 01	Improving.
25	Ditto	2.73	6.30	9 03	
32	Ditto	1.54	8.23	9.80	Stationary.
40	Ditto	1.59	8.26	9.78	
46	Parathyroid only, gr. 1/10, from 43rd day	1.14	8.66	9.80	
54		1.01	8.98	9.99	Improving.
61		—	10.4	10.4	
69		—	10.4	10.4	Healed.

Case 6.—Female, aged 30; varicose eczema. Before treatment the total calcium content was 10.77 mg. p.c. serum (combined, 2.69; ionic, 8.08). On the eighth day of treatment by parathyroid only, gr. 1/10, the combined calcium was 1.90; ionic, 8.00; total, 9.90 mg. p.c. serum. The irritation was lost after a week's treatment.

Case 7.—Male, aged 74; varicose ulcer of four years' standing. Before treatment the total calcium content was 9.70 mg. p.c. serum (combined 3.10; ionic, 6.61). On the eighth day of treatment by parathyroid only, gr. 1/10, the total calcium was 9.17 mg. p.c. serum (combined, 1.09; ionic, 8.08); on the fifteenth day the total was 9.32 mg. p.c. (combined, 0.66; ionic, 8.66). The ulcer was healing well, and the patient was up and at work.

Case 8.—Female, aged 64; three ulcers, each the size of a five-shilling piece; erysipelas and a thrombosed vein. Before treatment the total calcium content was 9.98 mg. p.c. serum (combined, 2.71; ionic, 7.27). On the fifteenth day of treatment by parathyroid only, gr. 1/10, the ionic calcium was 10.1 mg. p.c. serum. The patient was completely healed in ten days.

REFERENCES.

[1] Vines, *Journ. of Physiol.*, 1921 (55), 85. [2] Grove and Vines, BRITISH MEDICAL JOURNAL, 1921.

DISCUSSION.

Dr. DALE asked whether any reasons were known why the calcium ion concentration of the blood was so closely related to ulceration. In reply Dr. GROVE said that he knew of none, but regretted the absence of Mr. Vines, who had been more connected than himself with the theoretical aspects of the work. Dr. DALE also asked whether any investigations of the effect of ulceration on the clotting time of the blood had been made. Dr. GROVE replied that none had been made. Dr. Dale further drew attention to the difficulty of obtaining parathyroids from sheep and oxen. This was confirmed by Dr. MARTIN.

Dr. CLARK asked whether similar changes in the calcium ion concentration of the blood took place in septic conditions. On this, again, no work had been done.

ANAPHYLATOXIN.

BY

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(*Abstract.*)

IT is generally agreed that anaphylaxis is due to the formation of an antibody which combines with reinjected antigen. One theory attributes the symptoms caused by the reinjection to the occurrence of this combination in the cells. According to this view antibody in the blood is protective. The other theory supposes that union of antigen and antibody in the blood causes the formation there of a toxic substance, anaphylatoxin. Many methods of imparting such toxicity to guinea-pig's serum have been found, most of them having little direct relation to anaphylaxis. Dale and Kellaway have examined the nature of the change taking place in serum when it is rendered toxic by incubation with starch agar, etc. They find no evidence of protein cleavage, nor any change of viscosity or surface tension corresponding to the appearance of the toxicity. "Anaphylatoxin" does not act directly on plain muscle, as it should in theory, but it acts by producing changes in the blood of the nature of the changes which precede clotting. An animal can be rendered immune to "anaphylatoxin" by a subfatal dose, and its serum will transmit this immunity to another guinea-pig; but this guinea-pig, if previously anaphylactic to an antigen, retains its sensitiveness unimpaired.

Excess of antibody added to the saline bath in which anaphylactic plain muscle is suspended will protect it from the antigen. The author regards the similarity of the symptoms produced by "anaphylatoxin" to those of the true anaphylactic reaction as superficial and misleading, and adheres to the theory which attributes anaphylaxis to antibody located in the cells.

OBSERVATIONS ON CERTAIN ELECTRICAL SIGNS OF THE HUMAN BODY.

(*Preliminary Note.*)

BY

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ON a former occasion [1] it has been shown that an E.M.F. amounting to 0.5 volt is developed when cane sugar is fermented through the action of yeast. As is well known, this reaction takes place in two stages: first the inversion of the cane sugar by means of invertase, and secondly the conversion of the glucose and laevulose into alcohol and CO_2. In both these reactions an E.M.F. is developed. In the inversion of the cane sugar the E.M.F. was 0.03 volt. It may be objected that the E.M.F. developed in the second stage is due to the bubbling of the CO_2 through the fermenting liquid. But no such objection can be raised in the case of the inversion of the cane sugar. Hence it follows that the E.M.F. developed during fermentation cannot entirely be due to bubbling.

If we consider the equation

$$\underset{\text{cane sugar}}{C_{12}H_{22}O_{11}} + H_2O = \underset{\text{glucose}}{C_6H_{12}O_6} + \underset{\text{laevulose}}{C_6H_{12}O_6}$$

from the point of view of energy, we find that the heat of combustion of the cane sugar is 1355 cal., while that of the glucose is 677.2 cal., and of the laevulose is 675.9 cal. The equation becomes

$$\underset{1355\text{ cal.}}{C_{12}H_{22}O_{11}} + H_2O = \underset{677.2\text{ cal.}}{C_6H_{12}O_6} + \underset{675.9\text{ cal.}}{C_6H_{12}O_6}$$

and it is seen that 1.9 cal. are liberated during the inversion of the cane sugar. The equation, however, is incomplete without a consideration of the electrical energy, and therefore should be written:

$$C_{12}H_{22}O_{11} + H_2O = C_6H_{12}O_6 + C_6H_{12}O_6 + 1.9\text{ cal.} + X\text{ (E.M.F.)}$$

where X is a constant at present undetermined. There is thus a liberation of both thermal and electrical energy.

It will be noticed that the action of the invertase is from a state of higher to one of lower potential—that is, it acts as a catalyst through the conversion of potential into kinetic energy. At present synthetic enzymes are unknown, and it would seem improbable that they exist, for if an enzyme were to act synthetically a supply of energy would be required for its operation.

Again, it is known that in the formation of a carbohydrate, during photosynthesis from CO_2 and H_2O, thermal energy is locked up and becomes latent, to be again liberated when the carbohydrate is broken down, as, for instance, in respiration or muscular exercise. From the fact that E.M.F. is also liberated during the breaking down of carbohydrate, it must now be recognized that electric energy also becomes latent in the carbohydrate, and it follows that there are endo-electric and exo-electric reactions analogous to the endo-thermic and exo-thermic reactions.

Should this explanation prove correct it follows that all the variations of E.M.F. in the plant or animal are due to synthetic or catalytic reactions. The energy utilized in muscular contraction being principally derived from carbohydrate, it would seem that the E.M.F. developed during muscular contraction is proportional to the amount of carbohydrate utilized and further proportional to the work done.

It has been stated previously that the arterial and venous bloods possess a contrary electrical sign.[1] Unfortunately, in the experiments upon which this conclusion was based the air or carbonic acid was not passed through a strong electric field, so that further investigations are necessary before a definite conclusion can be reached on

this point. But, just as the CO_2 produced in alcoholic fermentations is ionized,[2] it is only natural to expect that the CO_2 liberated during muscular contraction is also ionized and that the ions are to be looked for in the venous blood. As there are both synthetic and catalytic reactions taking place in the human body, some experiments have been initiated to determine the E.M.F. of the human body and of the breath. In the method adopted the person under observation stands upon a platform, insulated by means of ebonite feet, and is connected with either a Laby-Burton string electrometer or a Wilson portable electroscope.

The Body.

The E.M.F. of the body has been found to be subject to great fluctuations in the same person, and further variations in E.M.F. exist between different individuals. Thus in a class of 29 students 10 exhibited a negative and 19 a positive reaction. In the same individual the E.M.F. has been found to vary from 10 volts negative to 3 volts positive with certain neutral points. At present it has not been found possible to construct a curve showing these variations.

The Breath.

The breath has been found to be negative in normal cases.

(*a*) When standing on the insulated platform and blowing through a glass tube, the drops of condensed breath were allowed to fall upon a wire connected to the electrometer. The electrometer then responded in the negative direction. An objection, however, can be raised to this method, as the capacity of the instrument would be changed.

(*b*) Upon a sheet of paper soaked in melted paraffin two similar pieces of tinfoil were pressed, opposite to each other, one on each side. One tinfoil plate was then breathed upon. The electrometer responded as these tinfoil plates were made to approach or recede from the electrometer. The one breathed upon indicated a negative and the other a positive reaction.

(*c*) A small glass tube, the edge coated with paraffin, the inside and outside coated with tinfoil, rested in the hollow of a block of paraffin. The inside tinfoil was connected to the electrometer. When breath was allowed to condense upon the outside, by blowing through a glass tube, the electrometer then moved in the positive direction.

The same effects can be observed when platinum is substituted for tinfoil. Experiments (*b*) and (*c*) show that small Leyden jars can be charged with the human breath. The E.M.F. of the breath measured in this manner is approximately 1 to 2 volts negative.

(*d*) A silk tassel, when electrified positively by being drawn through a sheet of rubber, is readily discharged by the breath; but when electrified negatively by rubbing with a glass rod it is not discharged by the breath.

Crowded Rooms.

Some attempts have been made to compare the electrical changes in crowded rooms. Thus an aerial of thin copper wire has been arranged in a lecture room and measurements taken of the electrical state of the air before, during, and after lecture to a crowded audience. As far as experiments have progressed it would appear that the air is electrified negatively by the expiration of those present in the room. May it be that electrons in the discharged breath are to be regarded as excreta?

REFERENCES.

[1] Electrical Effects accompanying the Decomposition of Organic Compounds, *Proc. Roy. Soc.*, B, vol. 84, 1911. [2] Electrical Effects accompanying the Decomposition of Organic Compounds: II, Ionization of the Gases produced during Fermentation, *Proc. Roy. Soc.*, A, vol. 91, 1915.

DISCUSSION.

Professor A. V. HILL suggested various control experiments to test the validity of Professor Potter's explanation of the electromotive forces he had observed in these enzyme reactions. For instance, in the case of the E.M.F. observed between yeast and glucose solution inside the porous pot and glucose solution outside, one ought also to inquire whether an E.M.F. was observed between yeast and a neutral solution (on which it does not react) inside and the same neutral solution outside. In regard to the observations upon the E.M.F. between the breath and the body, Professor Hill was sceptical as to how far these were not artificial effects due to the electric forces which are always present in a large town. He quoted instances of how his own work had been seriously interfered with by factors of this kind. He suggested that the observations should be repeated far out in the country so as to avoid such disturbances.

Professor POTTER, in reply, expressed his gratitude for these criticisms and suggestions, some of which he had already carried out.

On Thursday afternoon Professor Potter gave a practical demonstration, in the Botanical Laboratory, of the experiments described in his paper. Several members of the Section attended the demonstration and were much interested in it.

THE POISON ORGANS AND VENOMS OF VENOMOUS FISH.

BY

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I BEG to acknowledge the honour you do me in allowing me to address you on a subject which has interested me many years. Unfortunately our English textbooks on medicine contain little reference to the subject, and what they do contain is mostly incorrect. And even in such valuable textbooks as the *Cambridge Natural History* (1904) we find that the knowledge is not more advanced than can be obtained by reading Botard's work, published in 1889. Since that date much work has been undertaken, and among the most important communications on the subject are articles by Porta, Kobert, and the chapters on Poissons Venimeux in Calmette's work on Venoms. Experiments on fish venoms have been undertaken by Briot and others, yet an authority like Professor Ray Lankester published in 1910 an article on poison wounds, and stated that the evil effects of wounds inflicted by the sting-ray were due to the poisonous slime of the skin of the fish, and also that there was no definite poison sac in the weever fish.

From early times the question of true venoms in fish has been a disputed subject. Aristotle mentions several dangerous fish, notably Trygon, the sting-ray, and Scorpaena, but he was not explicit as regards the venomous nature of the sting, and he made no mention of the weever as a stinging fish. We first find precise information about fish with poison organs in the vast compilation of Pliny. He says Aranaeus (probably *Trachinus araneus*), a kind of weever found in the Mediterranean, "carries on its back a sting which is very dangerous, but there is nothing more terrible than the sting that arms the tail of Trygon, called Pastinaca by the Latins, which is five inches long. When driven into the root of a tree it causes it to wither. It can pierce armour like an arrow, it is strong as iron, yet possesses venomous properties." When we come to the Renaissance we find Belon, Rondelet, Salviani, and Gesner possessing exact ideas concerning Trygon, Trachinus, and Scorpaena. Speaking of Trygon, Pierre Belon describes the dart at the root of its tail, which is sometimes double and triple, with which it pricks those who touch it carelessly.

Rondelet describes the dart at length. Its margin is armed with teeth like the teeth of a saw, which enables the dart to enter easily, but tears the flesh as it is withdrawn by the backward slant of the teeth. Superstition and romance surrounded this dart with mysterious attributes. As Sir Thomas Browne quaintly remarks, it is conceived of special venom and virtues. If burnt, and the cinders applied to the wound in vinegar, it acts as an antidote. It relieves toothache, and helps cases of difficult dentition. If attached to the navel of a woman it causes her to have an easy childbirth, provided it be taken from a living ray, which is then thrown back into the sea. Aldrovander endeavoured to shake off the yoke of antiquity, and adopted the attitude of even modern writers. "I have searched," he says, "for a poison organ and have not found it; therefore, it does not exist," and proceeds to state: "These fish are dangerous only on account of the mechanical wounds they make and the depths to which their spines penetrate." More modern ichthyologists—Sonnini, Lacepede, and Cuvier—deny the presence of poison glands

in fish. Lacepede on every possible occasion denies the existence in the sting-ray, weever, scorpaena, plutosus, and muraena of any poison organ, and just as energetically Cuvier supports him, but allows that the pricks of certain fish are dangerous and produce acute pain. The opinion of these authors became almost a matter of dogma, and the works of ichthyology since their time have always denied the presence of a poison organ in fish.

Towards the middle of the last century Alman (1841) first described the gland at the root of the spine of the lesser weever, and his discoveries were widened and confirmed by Byerley, Gunther, Newton Parker, Bottard, and Schmidt. But even Bottard will not allow the sting-ray to possess a poison organ, and the *Cambridge Natural History* states that among the Elasmobranchs the eagle-rays and sting-rays have barbed serrated spines on the tail which inflict wounds far more severe than those caused by mere mechanical irritation, but except the mucus secreted by the gland cells of the skin, which may possess venomous properties, no special poison-forming gland is at present known. Porta a few years since described a poison gland in the sting-ray, but his description and plate does not convince me that he has yet correctly observed this very fleeting organ. I will, however, first show you the poison gland of the spiny dog-fish, which was first described by myself in February, 1920. I have reason to believe that a German investi-

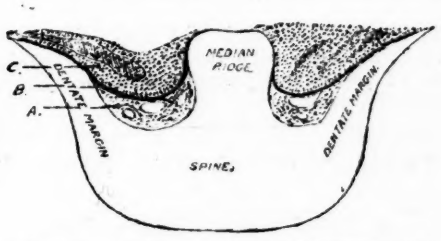

Fig. 1.—Section of spine of sting-ray (diagrammatic). Each groove is filled with A, alveolar connective tissue; B, pigment layer; C, epithelial layer, which consists of columnar and ovoid cells which secrete a venom which is discharged on to the tip of the teeth.

gator has written on that subject, but in spite of many efforts I have been unable to get on the track of his paper, which was referred to by Kobert as about to be published.

Fish inflict wounds by means of poison spines developed in connexion with their fins, usually the dorsal fin or with the gill cover or operculum. In certain Siluridae there is an axillary gland situated near the base of a pectoral spine, and in the plaice there is a spine situated ventrally which is reputed to be of a venomous nature. The spines at the root of the tail in sting-rays is in some cases developed apart from a fin, but there is reason to believe that in these cases it represents a fin, and, so to speak, takes its place. Bottard described three types of spines, but recent work brings the number up to six. Starting with the earliest type of fish, we have two kinds found among the Elasmobranchs.

Taking the spiny dogfish or spur-dog, we have a curved spine in relation to the anterior margin of its dorsal fins which is grooved on the posterior aspect extending a variable distance from the base. This groove contains a glandular structure, extracts of which can be proved to be venomous. The dart growing at the root of the tail in the sting and eagle rays is more or less flattened, and the lateral margins are serrated with teeth projecting towards the base. Facing the tail the spine has a central ridge, and a groove on either side exists between this ridge and the serrated margin. In these grooves lies a glandular structure.

In the bony fish the class Scorpaenidae contains several fish with poison glands, among which the weever is the best known type. Here we have the dorsal fin with spinous rays grooved anteriorly and posteriorly, and sheathed. At the bottom of this sheath is a definite poison gland. At the posterior margin of the gill cover is a more formidable spine deeply grooved above and below, and also surrounded by a sheath, which only exposes a small portion of the tip. At the base of the sheath lying partly in a bony, conical cavity, partly only surrounded by soft tissue, is a pear-shaped gland. In Synanceia the poison organ is still more developed. Each dorsal spine is in its terminal half provided with a deep groove on either side, at the lower end of which lies a pear-shaped bag containing milky poison, the sac of which is prolonged into a membranous duct lying in the groove and open at its point. Finally, we have the perfected organ of Thyllassophryne, in which the operculum and two dorsal spines are the weapons. The former is narrow and styliform, and perforated from its base to its extremity, like the venomous fang of a snake. A sac at the base of the spine discharges its contents through the apertures and the canal in the interior of the spine.

The injection into roach of filtered glycerin extract of the gland substance obtained by scraping the groove of a dog-fish's dorsal spine gave the following results: In most cases there was a period varying from ten to thirty minutes in which the fish lay quiescent, and during this period the respirations became very rapid, from 120 to 140 per minute. The general symptoms usually then subsided, but locally swelling and oedema occurred at the site of injection and the scales became erect over this area; no suppuration occurred. The fish, however, seemed ill, as it lost its pale colour and became dark and dull-looking, like fish allowed to remain too long in a live-bait can. In three fish I have observed definite symptoms of local paralysis of a spastic nature. The fish swam lying on the side of injection or else swam towards the inoculated side owing to the excursions of the tail taking place away from

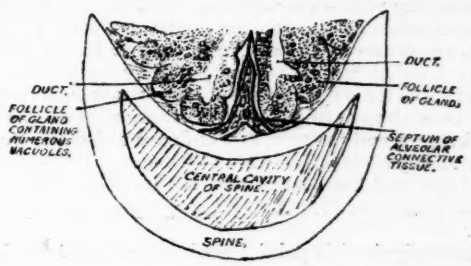

Fig. 2.—Section of spine of spur-dog or picked dogfish (diagrammatic).

the lesion. The fish were curved sharply towards the site of inoculation. In one fish I noted muscular spasms extending upwards from the tail and in another complete paralysis involving all the body to the level of the pectoral fins. Death appeared to be due to respiratory failure, and locally there was a pink oedema, but no haemorrhages, local or general.

Compare with these effects the action of weever venom on a goldfish as described in my paper in the British Medical Journal, 1906. It produces a local mortification of the tissues. When injected into the region of the lateral line, the fish is sharply bent away from the lesion on account of the predominant action of the lateral muscles of the opposite side. *Post-mortem* examination showed extravasated areas of blood at the site of inoculation, necrosis of muscle, and great congestion of the peritoneum. In mouse and guinea-pig inoculation under the skin of the back produced paralysis of the hind-quarters and similar local lesions. The haemolytic properties of this venom have been fully studied. It produces haemolysis without the addition of heated serum, but if it is mixed with glycerin and filtered through filter paper or through a porcelain candle, heated serum must be added to produce haemolysis.

In studying the paralytic effect of weever venom on white-blood corpuscles or the leucotoxic effect I have modified Wright's method of determination of opsonin. In making these experiments I took a volume of washed corpuscles, *plus* serum, *plus* a bacterial emulsion of *Staphylococcus aureus*, and a volume of salt solution in one capillary tube, and in the other the washed corpuscles, serum, bacterial emulsion and salt solution containing a drop of venom. After incubating for a quarter of an hour, the white cells in the poisoned tube, when stained in a film by Jenner's stain, showed vacuolation, deficient staining, and a marked diminution in the phagocytic action, 25 per cent. fewer bacteria being present in the count. As the bacteria stained equally well in each film, there was no reason to assume that this was due to bacteriolysis and not to a paralytic effect on the white cells. Considering how frequently secondary septic inflammations result from

the sting of these fish, these experiments would show how readily the barrier of phagocytosis may be broken down and the pathogenic organism from the dirty skin may find an entry into the system.

Treatment.

The question of treatment is of considerable importance, and the various empirical methods recommended are worthy of study. The fallacies of empiricism are not limited to the lay public, and a superficial reasoning is responsible for some of the methods in vogue even by the profession. For example, the injury is called weever sting; the ant's sting is supposed to be due to formic acid—which is certainly open to doubt—therefore ammonia, being an alkali, will counteract the acid sting of both ant and weever. It is the natural tendency for a person when injured to look round for something handy to apply. Among the natives of Mauritius and Reunion, where a similar stinging fish, the Synancia, frequently injures the feet of the fishermen, the natives fly to the leaves and seeds of plants growing by the seashore, in the same way as a person stung by a nettle flies to a dock leaf. Thus we find a local specific in the root and leaves of the datura, belonging to the family of Solanacea used by these natives, not without effect, in soothing the pain, but probably in an entirely empirical fashion, as the datura grows in abundance on the dry sand of the shore.

Among the plants employed in an empirical way to cure the prick made by the fish the seeds of *Abrus precatorius* seems, according to Bottard, to have the virtue of a specific. We are familiar with abrus or jequirity seeds as a remedy for certain chronic eye diseases; a toxin, abrin, derived from it has been shown to possess the characters of the toxins of diphtheria and tetanus, to which are allied the toxins of snake and various other animal poisons. It dissolves red blood cells, and has also a neurotoxic effect. Why should one toxin be a cure for the symptoms produced by another toxin?

To investigate this point I made experiments on haemolysis with weever venom, using various strengths of a solution of abrin in the mixture of washed corpuscles and venom. I found a definite diminution of haemolysis in those tubes containing abrin which appeared to be due to its powerful agglutinative action. Some experiments on small laboratory animals were not encouraging, as the toxic effect of abrin overshadowed any neutralizing effect on the poison.

To come to the local methods of treatment. We find that the fishermen have acted on the line of heat. The most frequent remedy is to plunge the part into boiling vinegar; another plan is to hold the affected limb over the funnel of the boiler which, in a smack, drives the donkey engine. A third plan is to apply heat vicariously by throwing the offending weever on the fire, with what results I am unable to state. Sometimes they soak a piece of brown paper in vinegar, let it dry, and, wrapping the paper round the finger, apply a light and let the paper gradually smoulder until the heat becomes no longer bearable. The effect of heat, no doubt, would tend to destroy the venom. Another not infrequent treatment consists in cutting out the fish's liver and applying it to the wound. Here again we are approaching a scientific treatment by an empirical method. We have it recorded that serpent's bile appears to be an antidote to serpent's venom, and also that a preparation of snake's liver is of value in the treatment, not only of snake-bite, but also of some disease toxins, as of tetanus and diphtheria. It is probable the efficiency of the liver preparation is due to the cholesterin it contains. The British Medical Journal of 1906 records two cases of tetanus treated successfully with injections of cholesterin, and it has been established by Preston Kyes that cholesterin markedly inhibits haemolysis by cobra venoms and cobra venom lecithin. It also inhibits haemolysis by arachnolysin.

When we come to the best methods of destroying the active properties of venom we find that, as with snake venoms, potassium permanganate, chloride of lime, and chloride of gold destroy the venom rapidly, and I have suggested that all smacks and drifters should be provided with a Lauder Brunton snake-bite lancet (which at one end contains potassium permanganate crystals), so that a really efficient remedy may be at hand. Both practical and experimental treatment by this method have been shown to be accompanied with the best results.

The method I now employ with immediate success, both as regards relief of pain and toxic after-effects, is to inject several minims of a 5 per cent. solution of potassium permanganate (which I have kept in sterile ampoules, provided by Brady and Martin of Newcastle) into the punctured wound with a hypodermic syringe. In these days of rustless needles this method can also be recommended for fishermen; with such needles and the solution in ampoules there need be no more septic hands and amputated fingers, the result of injuries produced by fish venoms.

DISCUSSION.

Dr. H. H. Dale, in thanking Dr. Evans for his most interesting paper, congratulated him on the enthusiasm and energy which had enabled him to to find time, amidst the arduous duties of general practice, to carry out these most important researches. He also complimented Dr. Evans on the beautiful series of microphotographs which had been shown by the lantern. In particular, he expressed much curiosity as to why a meshwork of pigment was found in the cells where the secretion of poison takes place.

Dr. Hele asked for reasons why immediate relief from the sting of the eagle ray was obtained by local injection of potassium permanganate and formol.

Dr. Evans attributed it to the destruction of the tox-albumins (which are very labile) either by oxidation—in the case of potassium permanganate, or by reduction—in the case of formol.

PHYSIOLOGY OF ORAL HYGIENE.

BY

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To understand properly the physiology of oral hygiene it is necessary to refer briefly to the physiology of mastication, for, although the chief function of mastication is the preliminary preparation of food in order to facilitate its digestion, it has a secondary function in that when suitable foods are masticated it cleans the teeth and facilitates the action of the saliva in doing likewise. It should be noted, however, that many foodstuffs which are consumed at the present day are hardly subjected to the process of mastication at all. The food is simply taken into the mouth, receives a general squash between the teeth, or between the dorsum of the tongue and the hard palate, and is then swallowed. This method of mastication, if mastication it can be called, is as a rule adopted for custards, fine meal porridge, soft puddings, and soft non-fibrous foods generally.

When there is a certain amount of crisp, spongy, or fibrous matter in the foodstuff, then the process is essentially different, and mastication is performed in a more thorough manner. In this latter case the food is crushed and torn between, and heaped on to the masticating surfaces of the teeth by the muscular contractions of the tongue, cheeks, and lips, and by the motions of the lower jaw. During comminution between the teeth, the juices of the foodstuffs, the saliva which becomes incorporated, and the suspended non-fibrous part, are pressed out from the fibres and gradually collect during the process on the middle of the dorsum of the tongue, which is gradually hollowed out for the reception of such food, and this part is then swallowed. The fibrous part of the food, however, is subjected again and again to the crushing and disintegration between the teeth. The rubbing of the food on the teeth, the motions of the tongue, lips, cheeks, and mandible materially aid in the mechanical cleansing of the teeth and gums provided suitable food for this purpose is eaten. When for any reason mastication is not performed on one side of the mouth, the teeth on that side become coated with mucus, tartar, and food débris. It is evident, therefore, that mastication of fibrous food is conducive to dental hygiene.

Now let me direct attention more particularly to mucus and saliva in regard to oral hygiene. I shall do so at some length because the subject is not referred to in physiological textbooks. Physiologists hardly seem even

yet to realize that oral hygiene is a physiological process, and that all the glands opening into the mouth, together with their secretions, are specially adapted for the maintenance of oral hygiene, and that these secretions are scarcely, if at all, of importance for any other function.

Mucus.

From the point of view of the oral hygienist, the supposed function of the mucus for lubricating the bolus of food so as to facilitate its passage down the oesophagus is whimsical, for inasmuch as the function of mastication is to comminute the food, and reduce anything in the nature of a bolus to a liquid or semi-liquid state before it passes to the back of the dorsum of the tongue, there is no bolus to lubricate. The mucus and saliva are thoroughly incorporated with the food, and consequently the semi-liquid food does not require lubrication. Just as the function of the mucus in the bronchial tubes is to keep these tubes clean, so the essential function of the oral mucus is to keep the mouth clean. Mucus is a liquid, tenacious and ropy in its nature, which under certain circumstances clings to hard substances. Chemically, perhaps, its best-known characteristic is that it forms a flocculent precipitate when treated with acids. These properties of mucus are well known. The following quotation from the work of Professor W. E. Gies and his collaborator, Dr. Lothrop, will indicate some further characteristics:

"Mucin occurs in saliva, and apparently also on dental surfaces, primarily as acid salts in concentrated colloidal solution. When viscid mucinous coatings are treated with basic material, such as carbonate of an alkali or an earthy element, the mucin mass becomes superficially more smeary and slippery by reason of the production of more soluble mucin salts at the surface. Complete mechanical removal of a mucin plaque from a tooth is facilitated by the addition of a basic material that renders the mucin superficially more viscous, but the slippery surface thus produced may make the application of considerable friction necessary for the detachment of the plaque. On the other hand, when a viscid mucinous deposit is treated with acid material, the mucin mass is completely disintegrated by a curdling or agglutinative process, the particles are devoid of adhesiveness to smooth surfaces, stickiness disappears because of the precipitation of caseous mucin itself, and the entire disorganized mass may be readily flushed away."

A consideration of these properties of mucus leads us to the conclusion that it is quite ingeniously suited for keeping the mouth free from the undue lodgement of food particles, when the foods are not converted by artificial means into some bland pap-like form which stultifies efficient mastication, negatives "considerable friction," and precludes the possibility of its being disintegrated so that it may be readily flushed away. It matters but little whether the chemical reaction of the food is neutral or alkaline, for during the mastication of food the saliva becomes alkaline if in its resting state it is acid, and the slippery state of the mucous coating on the teeth (and gums) is assured, while the ropiness of the mucus is left unimpaired.

On the other hand, if the food is more acid than can be neutralized by the copious flow of alkaline saliva, which it stimulates, the mucous films themselves are disintegrated and easily removed by the saliva and mucus after the acid has been swallowed. Thus, then, the mucus has not only the power of facilitating the removal of food particles and shreds which have been disintegrated by mastication, but it has also, under certain dietetic conditions, the property of being disintegrated and carrying its own disintegrated self away. Under unsatisfactory dietetic conditions—that is, when the food is habitually alkaline and so soft as not to stimulate mastication—the mucous coating on the teeth may remain too long, stagnate, and become infiltrated with the salts of the saliva; that is to say, tartar may be formed; or, if the food is of a carbohydrate nature and of a sticky character, it may be rapidly converted into lactic acid by bacteria, decalcification of the enamel may take place, and dental caries may be initiated. Should, however, the mucus not be saturated with carbohydrates of an impermeable and easily fermentable nature, the bacteria of the mouth slowly disintegrate the mucous coatings on the teeth and facilitate its removal on those surfaces of the teeth where it has not been removed by disintegration or considerable friction. It is quite possible, too, that the ptyalin in the saliva may digest the carbohydrate radical in the mucus, just as trypsin does. Why, otherwise, should we have a saliva rich in ptyalin poured out when sugar is taken in the mouth?

When we consider these facts we see that mucus is ingeniously devised for oral hygiene, and it is not devised for the lubrication of the bolus of food to facilitate its transmission to the stomach, nor is it devised, as has been suggested, to keep the numerous boluses of food in the stomach from the action of the hydrochloric acid, so that the ptyalin may have a chance of converting the starch in the boluses. Indeed, it seems much more probable that the thorough incorporation of food with mucus facilitates the penetration of the hydrochloric acid throughout the whole of the contents of the stomach after a meal, and possibly this is one of the reasons why a meal of such a physical consistency as demands mastication is more quickly and satisfactorily digested than a meal of a similar nature which has been reduced to a pap-like form before it is taken into the mouth.

Saliva.

It seems to me more than probable that physiologists will require to reconsider their teachings with regard to the function of the saliva. Hitherto they have looked upon it as the first of the digestive juices, and the salivary glands have been regarded as the first of the digestive glands. Some physiologists realize that the digestion of starch is not *the* function of the saliva; at least Professor Noël Paton considers that its more important function is mechanical (to facilitate speaking, eating, etc.). I shall try to indicate what the function of the saliva really is, but if we have not discovered the function of the saliva surely the sooner physiologists set about discovering it the better. For quite a number of years I have studied physiological problems because of their importance with regard to human welfare, and have come to the conclusion that to all intents and purposes the saliva is not a digestive juice, but that it is practically wholly for the purposes of oral hygiene. The older physiologists based their ideas on the fact that ptyalin has the power of converting cooked starch into achrodextrine and maltose. But many questions arise which would appear to throw considerable doubt upon regarding this as the chief function of saliva. That the digestion of uncooked starch is practically negligible is admitted by them; indeed, we are told that ptyalin does not digest uncooked starch (Halliburton, F. A. Bainbridge and J. Ackworth Menzies). If this be so, we may ask why ptyalin exists in the saliva of animals at all? Is it conceded that the saliva is not a digestive juice in animals? Again, it has never been contended that ptyalin digests sugar, but sugar stimulates a relatively violent flow of saliva rich in ptyalin. Why, too, should ptyalin exist in the saliva from birth, as we are told by some physiologists? Oral hygiene is no doubt necessary with a milk diet, but are we to believe that ptyalin is there to digest starch which normally is not present?

Again, why is starch, immediately it has been masticated and mixed with the saliva, transferred at once to the stomach, where the conditions are so frequently such that the digestion of starch by the ptyalin is immediately arrested, or if it is not immediately arrested, it soon becomes so? Physiologists have, of course, long recognized this supposed delinquency of Nature, and attempts have been made to explain how ptyalin may have some reasonable time to digest starch before the contents of the stomach become sufficiently acid to arrest the action of ptyalin. Thus, for example, some physiologists (Bainbridge and Menzies) say: "The food, after a meal is taken, forms a compact mass in the stomach, and the hydrochloric acid of the gastric juice penetrates comparatively slowly into this mass." It is only, of course, a pure supposition to say that the food forms a compact mass in the stomach; nevertheless, they evidently imagine not only that the food passes down the oesophagus in bolus form, but that the various boluses become one glorified bolus in the stomach.

It is significant that these physiologists never seem to refer to the fact that the contents of the stomach may be acid from the very beginning of a meal. A meal may commence with acid *hors d'oeuvre*, the bit of fish which follows may be served with lemon juice, meat may be eaten with salad well seasoned with vinegar, and stewed or raw fruit or both may complete the meal with a further supply of acid, while acid mineral or alcoholic beverages, which are sometimes supposed to stimulate digestion, may, and very frequently do, accompany the meal at various stages. Nevertheless, I do not know that we are told

that acids taken in these ways interfere with the digestion except among dyspeptics. Indeed, Professor Pavlov, speaking of the reaction of the food, says: "It is apparent that acidity enjoys a special preference in the human taste. . . . These facts are all physiologically comprehensible when we know that an acid reaction is not only necessary for an efficient action of the peptic ferment, but is at the same time the strongest excitant of the pancreatic gland."

Another point on which there seems to be confusion is with regard to the medium most suitable for the digestion of starch. According to Bainbridge and Menzies, "the digestive action of ptyalin on starch is most energetic in a neutral medium." According to Foster, "the action of saliva on starch is favoured by a slightly alkaline medium." It is curious how this is always referred to as if the slight difference in the reaction of the saliva were really of considerable importance in digestion. I have frequently tested the reaction of saliva between meals, but certainly am unable to draw the inference that the liquefaction of starch is at all influenced in any practical way by the reaction of such saliva. On the other hand, the fact that the saliva becomes very distinctly alkaline when food is eaten, and for some considerable time after it is swallowed, seems to the older physiologists unworthy of being mentioned.

To us who think that oral hygiene should be at least as common in man as it is in animals, all these apparently confusing and inexplicable facts have a simple explanation. The marked alkalinity of the saliva when food is taken has a significance in that it is important that it should have that reaction while the mucus is specially required for removing food particles from the mouth. If the saliva were sufficiently acid the mucus could not function in this way. Moreover, the acids which so commonly accompany foods might decalcify the teeth. On the other hand, the reaction of the saliva between meals is of practically no importance at all, because the conversion of starch in the mouth into soluble starch proceeds to all intents and purposes sufficiently satisfactorily, whether the saliva be neutral or faintly acid, or faintly alkaline to litmus. It has been the subject of much contention, possibly on account of its lack of importance, whether acidity or alkalinity of the saliva was the more unfavourable to the inception of dental caries. The slight acidity of the saliva between meals may be important because of its favouring the liquefying rather that the acid-forming bacteria, but the greater power of an alkaline saliva in neutralizing acid formed by bacteria may at least equally help to prevent caries. The point is not settled.

Towards the beginning of this paper I suggested a use for the ptyalin when sugar is taken into the mouth, and to those who appreciate why sugar is liable to cause dental caries the reason for a copious flow of saliva when sugar is eaten is obvious. Similarly, the desirability of a copious flow of alkaline saliva when acids are taken into the mouth is equally obvious if we value the preservation of the teeth; but why an alkaline saliva should be thought desirable for digestion if acid is "necessary for the efficient action of the peptic ferment, and at the same time the strongest excitant of the pancreatic gland," I fail to see.

While we are regaled with the importance of ptyalin for the digestion of starch, little is told us of the functions of the salts in the saliva, but they, too, are obviously of importance from the point of view of oral hygiene and the preservation of the teeth. Dr. Joseph Head made the important observation that when the superficial layer of enamel of the teeth has been slightly softened by acid this enamel can be rehardened by immersion in saliva, and thus it would appear that the salts in the saliva have an important restorative value as well as being prophylactic in function with regard to dental caries.

The saliva contains something more—amoeboid phagocytic cells, the so-called salivary corpuscles. They may be regarded as the scavengers of the mouth, and, as far as we can surmise, their function is simply oral hygiene. We are told that they are probably derived from the tonsils (Halliburton), and, although we might expect that lymphoid cells derived from the tonsils would pass down the throat rather than come forward and mix with the saliva, I at least have not seen reference to any experiment or observations to excuse the idea that they come forward into the mouth. The late Professor G. V. Black made a careful examination of the lymphatics surrounding the necks of the teeth, and refers to a portion of the connective tissue in immediate conjunction with the tooth, which is not covered by the epithelium, and says: "It seems to be through this space that the cells—the so-called salivary corpuscles found under the free border of the gingiva—pass." "These may be found at any time under the healthy gingivus, and their numbers are augmented with every irritation of the membrane."

It has always appeared to me that the only satisfactory method of controlling the bacteria in the sulcus between the gingival margin and the tooth is by means of these phagocytic corpuscles. If we admit that the salivary corpuscles exude primarily into this sulcus, we observe at once their importance in oral hygiene, and—in passing, it may be said—the value of masticating food of such a nature as will cause an irritation, or rather stimulation, of the periodontal membrane, and thus assure a sufficient supply of these scavengers and thereby prevent the onset of pyorrhoea.

All things considered, it appears that the function of the saliva is, *par excellence*, oral hygiene, and no matter whether the food passes into the mouth and down the oesophagus in the ordinary way or whether the food passes up from the stomach and out of the mouth, it may in general be said that the saliva is secreted in quality and quantity proportionate to the needs of the food, to expel the food as completely as possible from the mouth. I need hardly mention that although a copious flow of saliva is induced by vomiting, even physiologists of the old school could scarcely claim that under these circumstances the saliva was to be regarded as the first of the digestive juices.

I have put forward the preceding observations to induce physiologists to take up this subject, and to give an authoritative lead. For without this the rank and file of the medical profession cannot be expected to teach the public the new ideas with regard to oral hygiene consistently, and until the function of the saliva is properly taught the valuable work which has been and is being done by medical officers of health and health workers will have but little chance of achieving its beneficent results.

DISCUSSION.

Dr. DALE expressed his appreciation of the research which is being done by dentists upon the physiology of oral hygiene. Although physiologists (he continued) do not believe the zymolytic function of ptyalin as important as Dr. Sim Wallace supposes they do, yet in depriving ptyalin of any importance as an enzyme Dr. Sim Wallace leaves it with no definite function at all. In considering the origin of dental caries more importance should be attached to dietetic deficiencies in early life than to the cleansing action of saliva. Nor can the latter factor easily explain why some people never have to visit a dentist at all, whilst others, in spite of the utmost care, have to do so frequently.

Dr. CLARK remarked that if the function of the mucus in the saliva was only a cleansing one, it would be reasonable to expect that when sand was given to an animal instead of meat a higher proportion of mucus would be secreted in the saliva. Actually a more watery saliva is secreted. The same applies to the quality of saliva secreted in connexion with vomiting. It also contains more water instead of more mucus than normal saliva.

Dr. SIM WALLACE, in reply, said: My reason for not making reference to developmental deficiencies in my paper was that this has nothing to do with the physiology of oral hygiene. Moreover, oral hygiene is at least as important when there is hypoplasia of the enamel as when there is not. For other reasons the Mellanby experiments were hardly worth taking notice of. As far as I could gather the hypoplasia exhibited in these experiments must have been in existence before the special feeding of the puppies was commenced. The crown of a child's first permanent molar is formed five or six years before it erupts, and no doubt the crown of the corresponding tooth in a puppy is formed at least six months before eruption. If teeth show hypoplasia when they erupt, attention should be directed to conditions existing during the formation of

the crown, and not to the special feeding after the crowns are formed. The crown of a tooth does not grow after it erupts.

A relative lack of fat-soluble A in the food seems to have no effect whatever in causing dental caries. Thus it was found that during the war, when foods containing fat-soluble A—for example, cream, butter, milk, and meat—were very scarce or unprocurable, dental caries actually decreased. In Shropshire there was, indeed, a very remarkable decrease. Nor is there apparently any relationship between the prevalence of rickets and dental caries. In England about the same percentage of children have decayed teeth whether they have had rickets or not. In America and Australia, where rickets is extremely rare, dental caries is about as rampant as it is in England. There is no extraordinary difference in teeth with regard to resistance to dental caries. Any tooth, whether "good" or "bad," can easily be decalcified by lactic acid even when it is weaker than it frequently may be found under fermenting carbohydrates in the crevices of the teeth. The enamel, being lifeless, offers no active resistance whatever.

Often teeth with well-formed and thick enamel are specially liable to caries, simply because the thicker the enamel the deeper the crevices, and consequently the more liable to lodge carbohydrate. This is well exemplified in the upper later incisors, which never decay on the lingual aspect except when the enamel ridges are thick and form a pit or crevice on the lingual surface. Neither are there racial differences in resistance. The once excellent teeth of the Kaffirs have become about as bad as those of Europeans where they have been subjected to European food. Similarly with the Maoris and our own ancestors, both had excellent teeth.

The answer to the question of the use of the ptyalin is simply that it is there to liquefy any particles of starch which may become lodged in crevices or impacted between the teeth. When it has done this, so as to facilitate the flushing away of such starch, it has fulfilled its function of helping to secure oral hygiene. With regard to saliva being watery when sand is put into a dog's mouth, this does not run counter to anything I have said. If a watery saliva is effective in getting rid of the sand, there is no need for the saliva to contain much mucus.

THE CHEMOTHERAPY OF PYOGENIC INFECTIONS WITH SPECIAL REFERENCE TO THE ANTISEPTIC PROPERTIES OF ACRIDINE COMPOUNDS.*

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THE effects of operative and mechanical intervention and of specific immunization in the treatment of pyogenic infections are not sufficiently successful to discourage the attempt to secure additional aid from the use of chemical compounds. These may act either by stimulating the tissues of the host or by depressing the virulence of the infective organisms. There is no certain evidence that elevation of resistance can be effected by chemical means; on the other hand, many substances damage the vitality of bacteria. Hence the search for suitable antiseptics appears to offer a prospect of success. It has long been known, however, that the antiseptics commonly employed have little influence on organisms in contact with the tissues, since they act as general protoplasmic poisons, and are as a rule more harmful to the host than to the bacteria. Accordingly it is necessary to search for compounds with more desirable properties. Incidentally there is the complex problem of determining what constitute desirable properties, as it is necessary to decide by relatively simple preliminary tests what substances should be subjected to therapeutic trial. It appears that one should aim at high antiseptic potency, especially under conditions as nearly as possible resembling those which may be met with in the body, together with low toxicity for mammalian tissues. Toxicity may be measured for the animal as a whole when the substance is injected subcutaneously or intravenously, and also for particular functions—for example, phagocytosis; and for special tissues—for example, epithelial membranes, such as the conjunctiva—by local application of the drug. These points may be illustrated by reference to the diamino-acridine compounds ("flavines"), which appear to be the most efficient antiseptics from the therapeutic standpoint so far investigated by us.

(We were indebted to Drs. Barger and Ewins of the Department of Biochemistry and Pharmacology of the Medical Research Committee for the preparation of acriflavine and proflavine.)

Antiseptic Potency.

The method usually adopted in defining the value of an antiseptic is to express its potency as the ratio of the reciprocals of the sterilizing concentrations of the substance in question and some standard compound, commonly phenol. In calculating this ratio the period of contact of the bacteria with the antiseptic is as a rule limited to a few minutes. Certain substances—for example, phenol and mercuric chloride—act rapidly; on the other hand, there are many powerfully antiseptic organic compounds, such as those of the diamino-acridine group and the di- and tri-aminotriphenylmethane derivatives (brilliant green, crystal violet, etc.), which cause death of organisms comparatively slowly; but, short of lethal action, they exert a powerful inhibitory or "bacteriostatic" effect. Hence it appeared that the antiseptic value of a substance intended for therapeutic purposes might be most suitably gauged by estimating its power of restraining growth and eventually causing death of the organisms, ample time being allowed for the latter result. Provided that the antiseptic is not neutralized in the tissues or that, if so, it can be frequently renewed, mere slowness of lethal action as determined *in vitro* matters little; the organisms will be controlled from the beginning.

Accordingly, fluid medium containing the antiseptic in varying concentration was inoculated with different types of bacteria, and after the mixtures had been kept for twenty-four to forty-eight hours at 37° C. the occurrence of proliferation was examined for by noting whether turbidity had developed in the inoculated tubes as compared with the sterile controls, and also the number of viable organisms present was ascertained with sufficient accuracy by subculturing a loopful on solid medium. Thus effects short of total sterilization can be estimated; whereas by subculturing in fluid medium it is impossible to detect any degree of action short of complete sterilization. In addition to a watery solution containing a small amount of bacteriological peptone (0.7 per cent.), sterile ox serum, previously heated for several hours at 56° C., in order to destroy normal bactericidal power as well as accidental contaminating organisms, was employed.

Serum may be regarded as a highly suitable test medium. In virtue of its content in protein it has a powerful action in reducing the bactericidal effect of most strong antiseptics (for example, the potency of mercuric chloride is reduced one hundred times); at the same time it is very constant in composition and reaction, and it represents the fluid constituent which antiseptics in contact with the tissues are exposed to; for instance, in a surgically treated wound.

The test organisms commonly used were *Staphylococcus aureus* and *B. coli*; they represent types whose behaviour toward antiseptics is liable to differ markedly, a character which suggests a far-reaching difference in their biology. Experiments have shown that within wide limits the efficiency of the antiseptic as tested by the method described is practically independent of the size of the inoculum—for example, from 0.000025 to 0.1 c.cm. of recent peptone water culture per 1 c.cm. of medium. But inoculation with very large numbers of organisms should be avoided, as these fail to maintain themselves in the medium even in the absence of any antiseptic. Under the conditions of the test the sterilizing concentration of

* The original work referred to here was mainly undertaken under the auspices of the Medical Research Council. The chemical portion of the investigation was carried out, in co-operation with Mr. R. Gaunt, in the Organic Chemical Laboratory, University of Leeds; the biological part was carried out in co-operation with Miss R. Gulbransen at the Bland-Sutton Institute, Middlesex Hospital, and the Pathological Department of the University and Western Infirmary, Glasgow; and special work was also done with Drs. W. Gilmour, E. L. Kennaway, and L. H. D. Thornton.

diamino-acridine methochloride ("acriflavine"), as determined by the modal value obtained in an extensive series of experiments, is for *Staphylococcus aureus*, in peptone water 1 in 100,000, in serum 1 in 200,000; for *B. coli*, in peptone water 1 in 20,000, in serum 1 in 100,000. The striking result therefore appears that this substance is not reduced in its antiseptic power by serum. As regards the bactericidal action in watery medium, relatively small differences in hydrogen-ion concentration produce marked alterations in the activity of the antiseptic (see also Graham-Smith and Davis). Thus by altering the P_H value of the medium from between 4 and 5 to 11 the sterilizing concentration for *B. coli* was lowered progressively from 1 in 2,000 to 1 in 200,000; the value for *Staphylococcus aureus* was affected similarly. As with other substances, so also in the case of the acridine compounds, organisms are met with which exhibit selective resistance—for example, certain atypical members of the *coli* group. It would appear, however, that such resistance is natural and not acquired, and that acquired resistance towards the dye, as recorded by Shiga in the case of *V. cholerae*, can only be slowly attained by staphylococcus or *B. coli*, and is not likely to be a serious factor in causing failure in treatment.

Methods of testing the antiseptic power of acriflavine by repeated inoculation of a mixture of dye and serum, and also by adding the antiseptic after growth of organisms (*B. coli*) had occurred in the medium, have shown that rapid exhaustion or deterioration of the antiseptic does not occur. The latter experiment resembles more closely than the others the condition met with in treating an infected wound. It has been found that a heavy growth of organisms is sterilized by the subsequent addition of the antiseptic with as great ease as are a few organisms added to the medium simultaneously with the antiseptic. A noteworthy fact is that in repeated tests carried out with a view to determining the sterilizing concentration, a certain amount of variability appears in the results. Similarly, irregularity in sterilizing action may occur in a series of tubes containing ascending doses of antiseptic. Thus occasionally concentrations of 1 in 130,000 and 1 in 40,000 may sterilize the mixture, while 1 in 100,000 fails. This observation corresponds with that recorded by Richet and Cardot on exaggerated variations in the amount of acid formed in different tubes of whey containing a constant concentration of certain antiseptics when all are inoculated similarly with a lactic organism. A possible explanation of such irregularity is that where lethal effects are slowly produced, as with the compounds here considered, there is a critical concentration in the vicinity of which the balance may be inclined in favour of the organism or of the antiseptic by factors which at present escape complete analysis. Diamino-acridine sulphate (proflavine) was found to be practically indistinguishable from the methochloride in antiseptic action. When red blood corpuscles, pus, or minced muscle (Fleming) are added to solutions of the dyes reduction in antiseptic power occurs; but Gay and Morrison have found that acriflavine is more actively bactericidal for streptococci when added *in vitro* to pus from experimental empyema in the rabbit than it is for the same organism in broth. In rabbits it is possible by means of intravenous injections of proflavine, which do not affect the health of the animal, to render the serum bactericidal for several hours when tested *in vitro* with *Staphylococcus aureus* and *B. coli*.

Toxicity.

When tested on the animal body as a whole, by subcutaneous injection, it is found that healthy mice of 20 grams weight will tolerate as a maximum dose 0.003 gram of proflavine (sulphate) and 0.0006 gram of acriflavine, whereas mercuric chloride is about ten times more toxic than the latter. In the case of rabbits 0.05 to 0.07 gram proflavine sulphate intravenously per kilo of body weight is well borne. As the result of an experiment on a monkey under an anaesthetic (A.C.E. mixture at first and later ether), for which we are indebted to Dr. Dale, it appeared that administration at a rate as great as 0.0025 gram per minute per kilogram of body weight caused some danger to the heart; under similar conditions this would mean that an average man weighing 60 kilograms should not receive an intravenous injection at a rate exceeding 50 c.cm. of a 1 in 330 solution per minute. (It is likely, however, that in the experiment the susceptibility of the heart was increased by the anaesthetic.) Doses of 0.33 gram of proflavine sulphate in physiological saline have been given intravenously at this rate to adult subjects without untoward effects beyond transient sickness. The skin becomes stained of a yellow tint, which, however, completely disappears in the course of twenty-four to forty-eight hours. The dye is excreted by the kidneys, and, as estimated from the absorption spectra by Dr. S. Russ, fully a third of the amount administered can be accounted for in the urine passed during the subsequent two days. There is also excretion of the substance by the bile in the monkey.

Proceeding now to the action on cells and tissues, phagocytic experiments showed that with mercuric chloride, phenol, iodine, chlorine water, hypochlorites (in the form of "eusol" and Dakin's solution) and chloramine-T, the concentration which sufficed to kill bacteria approached closely to that which *in vitro* interfered seriously with phagocytosis; on the other hand, with acriflavine and proflavine several hundred times the bactericidal concentration was required before phagocytosis was inhibited. In this connexion recently reported experiments of Gay and Morrison are of much interest; using leucocytes (obtained from the peritoneal cavity of guinea-pigs after injecting broth) along with streptococcus culture and antistreptococcus serum, all incubated for two hours in the presence of varying amounts of acriflavine, they found that there was a range of concentrations from 1 in 6,400 to 1 in 128,000 in which the antiseptic had apparently not inhibited phagocytosis and had also sterilized the mixture. In the controls, containing serum without dye, the organisms, although phagocytosed, were not killed. With respect to the action on connective tissue in the human subject, there has been no evidence of any deleterious effect when a few cubic centimetres of 1 in 1,000 solution were injected subcutaneously. By contact with the exposed tissues in a wound the progress of formation of granulation tissue may after a time be interfered with, thus producing an inert surface covered by a fibrinous pellicle, as was first noted by Drummond and McNee. But the evidence points to this result being brought about by some auxiliary factors not yet precisely defined, possibly evaporation leading to concentration of the dye, as suggested by Pilcher and Hull. From the reports it would appear that the procedures of different surgeons may vary in details which can hardly be appreciated from written descriptions, and yet which are of decisive effect as regards their influence on wound healing. Thus it is a fact that large wounds may be treated with acriflavine solution (1 in 1,000) for weeks without disturbance in the development of granulation tissue or interference with epithelial ingrowth; this has been noted by Pilcher and Hull, and has been again recently demonstrated to one of the authors in a series of cases by Dr. Charles Bennett.

The attempt to correlate antiseptic action with toxic effects on connective tissue by means of tissue cultures *in vitro* has been made by Lambert. Mueller tested in this way the flavine compounds and a series of triphenylmethane dyes and found that the former were the only ones which did not require a greater concentration to inhibit streptococci than to inhibit tissue growth. It is noteworthy that in the case of brilliant green (tetraethyldiaminotriphenylmethane sulphate), which has not been credited with the property of inhibiting growth of granulation tissue by clinical observers, five times as high a concentration was required to inhibit streptococci as to inhibit the tissue culture. Hence, as Mueller concludes, "it is altogether probable that in the body a greater resistance is shown by the cells, while bacteria, on the other hand, may offer less, as a result of even a moderate protective action on the part of the body against invading organisms." In view of the application of antiseptics to delicate epithelial surfaces, such as that of the urethra, it appeared important to attempt to estimate irritating properties. With this object several drops of varying concentrations were applied to the conjunctivae of rabbits, so as to keep the surface bathed for three minutes. The result was that the flavines, in relation to their antiseptic power, were very much less irritating than any of the other antiseptics already mentioned (concentrations of 1 in 150 of acriflavine and 1 in 50 of proflavine being generally tolerated without causing irritation), whereas the tolerated concentration of mercuric chloride lay between 1 in 250 and 1 in 500.

It is noteworthy that in the examination of a considerable number of commercial preparations of acriflavine no appreciable differences in antiseptic power have been detected, but certain specimens were definitely more irritating than the average. This property may be of considerable importance in relation to the treatment of gonorrhoeal urethritis; there does not seem to be any method of determining it other than the biological test. Blood coagulation is markedly retarded *in vitro*, as noted by Fleming, and confirmed by one of us with proflavine, as well as acriflavine, but no deleterious effects which can be ascribed to such action have been met with in the treatment of wounds. Red blood corpuscles—for example, of man or ox—suspended in 0.85 per cent. sodium chloride solution are actively agglutinated by acriflavine and lysed by proflavine, but when serum is present to the extent of 50 per cent. by volume a concentration of 1 in 750 of these substances has no such action.

To summarize the results relating to antiseptic power and toxicity, it may be said that the diamino-acridine compounds possess much more powerful bacteriostatic and bactericidal action in comparison with their toxicity for mammalian tissues than any other substances hitherto investigated. In addition, they are stable, and do not become inactive through undergoing chemical changes in the tissues. These, and certain other compounds referred to later, are the only powerful antiseptics which are not reduced in their activity by protein solutions such as serum.

Therapeutic Tests.

In the case of certain trypanosome and spirochaete diseases chemotherapeutic agents of so high potency are available that a single injection will cure an animal already moribund. It may be said at once that nothing approaching this has yet been found for bacterial infections. But experiments have shown that it is possible by means of antiseptics, other than Morgenroth's optoquin, to prevent the development of septicaemia in mice previously inoculated intraperitoneally with many times the fatal dose of virulent pneumococci. When dealing with an infection so rapidly invasive in character it is not surprising that the antiseptic must be introduced into the peritoneal cavity within a short period after the organisms. Obviously, the conditions are not adapted for demonstrating the special properties of a bacteriostatic agent; thus cures were obtained with phenol and corrosive sublimate as well as proflavine. Successful results were obtained only in a proportion of the experiments; but any positive results of this nature are important in view of the opinion so widely held that antiseptics only act detrimentally on the infected animal.

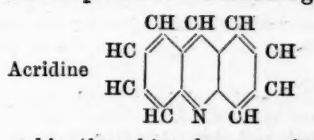
The fact that the antiseptic may prove effective without itself actually killing the organisms was seen in the case of an animal inoculated intraperitoneally with a mixture of proflavine and pneumococci; it survived and was examined after a month when a chronic peritonitis was found with abundant pneumococci on the surface of the liver. It seems reasonable to conclude that the antiseptic probably acts by reducing the numbers of viable organisms or their virulence, so as to adjust the balance in favour of the tissues. In the case of intraperitoneal infection with *V. cholerae* in guinea-pigs and mice, similar results have been obtained (Baumgarten). Many negative results have been recorded, as in the carefully planned experiments of Gay and Morrison, who failed to effect cure in streptococcal empyema of rabbits by intrapleural injections of acriflavine. It is to be remembered in this connexion that infections in animals seldom show the strictly localized character which is so common in the human subject; generalized infection is beyond the reach of a locally acting antiseptic, while, of course, toxaemia which has once developed cannot be influenced by purely antiseptic substances. However, an agent which fails to check generalized infection or to influence toxaemia is not therefore disqualified for use in local infections. But the estimates on which reliance must then be placed are mainly clinical, and these have shown an extreme divergence. Certain conclusions, however, may be drawn: (1) that in the hands of many surgeons the flavines when applied by relatively simple methods enable improved results to be obtained in the treatment of localized pyogenic infections; (2) that a similar value attaches to their use in acute gonorrhoea—Dr. David Watson reports (unpublished) that the statistical records of 8,000 cases support his original estimate of acriflavine (see also Davis and Harrell); (3) that the flavines are of particular value in the prophylaxis of infection—that is, to prevent the occurrence of inflammation and suppuration, when applied shortly after the organisms have gained access to the tissues. Thus, cases of war wounds after excision and the application of flavine could be transported, with the probability that, although untouched in the interval, they would arrive at their destination without manifestations of infection or suppuration. This useful prophylactic action has been variously styled "cold storage" or "pickling" of wounds—terms which are unfortunate, inasmuch as they may imply that the beneficial effect is limited to this stage. It is of interest that various clinical observers have agreed that acriflavine is superior to proflavine in overcoming infection. Laboratory tests have not so far explained this difference. As regards attempts to influence generalized infection, it is scarcely to be expected that the transient antiseptic property conferred on the blood serum by an intravenous injection can have any decisive effect.

Urinary Antisepsis.

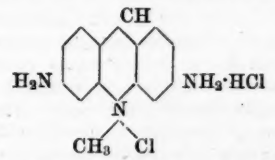
The fact that the flavines are excreted in the urine has led to investigation of their possible value as urinary antiseptics. It was found independently by Davis and White and by ourselves that these substances acted best when the reaction was alkaline, and that antiseptic urine was excreted after an intravenous injection. Out of over two hundred aniline dyes investigated by Davis, White, and Rosen, only the two flavines, in addition to chloromercury fluorescein, caused the secretion of antiseptic urine after intravenous injection. The effect of proflavine administered in this fashion was tested in cases of *B. coli* pyelitis in children by Dr. Leonard Findlay (unpublished), who found a very definite effect in the form of diminution of pus and organisms in the urine for twenty-four hours following the injection; also the bacilli became long and filamentous; but no permanent result was obtained. More recently Davis has found that the urine in the human subject, provided it is alkaline, becomes antiseptic after the administration of the flavines by the mouth; this is probably the first time that such an effect has been attained by a drug.

The Relation between Chemical Constitution and Antiseptic Action in the Acridine Group.

Diamino-acridine methochloride had been prepared by Benda for Ehrlich and was named "trypaflavin" on account of its powerful therapeutic properties in experimental trypanosome infections. We are not aware that its action on bacteria had been tested prior to our work, although Shiga published almost simultaneously results of his investigations on its action on *V. cholerae*. The parent substance is a compound of the following formula:



that is, a combination of two benzene rings and a pyridine. If the two side wings are removed, a pyridine nucleus remains; if only one wing is detached a quinoline nucleus results. It seemed possible that the antiseptic activity of acriflavine (diamino-acridine methochloride)



might reside either in the pyridine or quinoline nucleus reinforced by one or more amino groups; therefore, substances of this type were first prepared by one of us (J. B. C.). In addition, series of acridine derivatives were prepared and tested for their antiseptic power in order to determine if possible whether any law could be established relating chemical structure and antiseptic action within the group. Also, observations have been made upon phenazine compounds, on account of their close relationship to the acridine group.

Fragments of the Acridine Molecule.

The following were tested:

α-aminopyridine hydrochloride.
α-dimethyl-aminopyridine methiodide.
quinoline hydrochloride.
o- m- p- and a- aminoquinoline hydrochloride and methochloride.
8.hydroxyquinoline sulphate, methochloride and methopicrate.
tetrahydroquinoline hydrochloride.
methyltetrahydroquinoline methiodide.
α- and β-naphthoquinoline hydrochloride and methosulphate.
tetrahydro- α and β-naphthoquinoline hydrochlorides.
diamino β-naphthoquinoline and its methochloride.
hydrochlorides of 1.4. and 1.5.naphtho-dipyridine.
1.1.dinaphthyl-2.2.imine.

The striking feature, in general, is the low grade of antiseptic power shown by these bodies. Thus, the hydrochlorides of quinoline, tetrahydroquinoline and the aminoquinolines, all failed to sterilize in dilutions exceeding 1 in 2,000, either in peptone water or in serum. The methochlorides of the aminoquinolines, except in the case of the ortho-compound, showed accentuation of antiseptic action in serum as compared with the hydrochlorides of the corresponding bases—a characteristic result which will be discussed when dealing with the acridine group. The hydrochlorides of α- and β-naphthoquinoline were slightly more active than those of the bases already mentioned. No striking difference could be established between these and their tetrahydro-derivatives. Diamino-β-naphthoquinoline also showed no enhanced efficiency. The methosulphates of both naphthoquinolines and of diaminoquinoline showed intensified action in serum. The sulphate of 8.hydroxyquinoline, long known as an antiseptic under the name of "chinosol," is extremely active for *Staphylococcus aureus* (1 in 400,000 sterilized in peptone water and 1 in 100,000 in serum); this contrasts with the slight effect of hydroxy-acridine and aminoquinoline compounds. On the other hand, it is remarkable that the methochloride and methopicrate of the base do not show enhanced action. 1.1. dinaphthyl-2.2.imine exhibits great discrepancy between its powerful action on staphylococcus and lack of effect on *B. coli*, which is similar to that exhibited by the triaminotriphenylmethane compounds, hexa-methyl and ethyl violet. But the most striking character of dinaphthylimine is the reduced effect in serum; thus 1 in 2,000,000 sterilized staphylococci in watery medium, but 1 in 1,000 failed to kill in serum. This is the most extreme reduction observed in the case of any substance, being twenty times greater than that effected by serum on mercuric chloride.

So far, therefore, it has not been possible to obtain fragments of the molecule which equal or even approximate closely to diaminoacridine in antiseptic properties.

Acridine Group.

The following were tested:

Hydrochlorides and methochlorides (or in some cases methosulphates) of acridine.
9.phenylacridine.
3.6.dimethylacridine.
2.7.diaminoacridine (also the sulphate of this base).
2.7.diamino-3.6.dimethylacridine.
2.7.diamino-3.6.dimethyl-9.phenylacridine.
2.amino-3.methyl-9.phenylnaphthacridine.
2.dimethylaminonaphthacridine.

The following general conclusions may be drawn from the results:

Action of the Amino Groups.

The introduction of amino-groups enhances the antiseptic potency both for *Staphylococcus aureus* and *B. coli*—for instance, acridine and diaminoacridine; dimethylacridine and diaminodimethylacridine. Thus the sterilizing concentrations of acridine hydrochloride for the two organisms respectively in peptone water are 1 in 2,000 and 1 in 1,000; in the case of diaminoacridine the figures are 1 in 200,000 and 1 in 20,000.

Effectiveness in Serum.

This is a characteristic of the compounds with unsubstituted amino-groups, and especially of the methochlorides of these bases. The further introduction into the diamino compounds of a phenyl group attached to the medial carbon atom, however, diminishes the action in serum; this is exhibited both in the case of 2.7.diamino-3.6.dimethylacridine and 2.amino-3.methylnaphthacridine. On the other hand, the methochloride of 9.phenylacridine is much more active than that of acridine.

Comparison of the Antiseptic Power of the Methochloride and the Hydrochloride of the same Base.

The methochloride (or methosulphate, or methonitrate) is never less potent than the hydrochloride in the presence of serum, and in some cases the increased effectiveness shown by the methochloride is very remarkable—for example, in the case of 2.7.tetraethyldiaminoacridine, 2.7.diamino-3.6.dimethyl-9.phenylacridine, 2.amino-3.methylnaphthacridine, and 2.dimethylaminonaphthacridine. Thus with the first of these bases 1 in 10,000 of the hydrochloride sterilizes staphylococci, while 1 in 400,000 is sufficient of the methochloride. In the case of the simplest member of the amino series, 2.7.diaminoacridine, and also where the substituents are directly attached to the outer rings, as in 2.7.diamino-3.6.dimethylacridine, the hydrochloride and the methochloride are practically equal in antiseptic power. It is noteworthy, however, that when the antiseptic power of diaminoacridine is diminished by substitution of ethyl radicals in the amino-groups, the enhanced action of the methochloride over the hydrochloride again becomes apparent. So far no rational explanation of the enhanced efficacy of the methochloride has suggested itself. The comparative effects of the hydrochloride and the methochloride of the same base in peptone water show a much less regular behaviour.

The hydrochlorides of certain of the compounds require the presence of a slight excess of hydrochloric acid in order to cause solution—for example, in the case of 9.phenylacridine and 2.amino-3.methylnaphthacridine; but the enhanced effect of the methochlorides over the respective hydrochlorides is not to be ascribed to the higher hydrogen ion concentration of the solution of the latter, since the addition of hydrochloric acid to the methochloride, so as to produce a solution of similar reaction, did not reduce the antiseptic power to that of the hydrochloride.

The Substitution of other Radicals for the Methyl Group in Diaminoacridine Methochloride.

The following were examined: Ethyl, propyl, n- and iso-butyl, iso-amyl, phenyl, benzyl, also the chloroacetate chloropropionate, and chloroacetanilide derivatives. The result was that within the limits of experimental variation these compounds are practically identical with the methochloride in their antiseptic power for both organisms.

The Substitution of Alkyls in the Amino Groups.

Tetramethyl- and tetraethyl-diaminoacridine were investigated. The tetramethyl hydrochloride, while practically equal to unsubstituted diaminoacridine in its action on *Staphylococcus aureus*, was distinctly inferior for *B. coli* both in peptone water and in serum. The tetraethyl compound was still weaker; thus with the latter the sterilizing concentration for *Staphylococcus aureus* in peptone water was 1 in 100,000 and in serum 1 in 10,000, while for *B. coli* a concentration not less than 1 in 1,000 was required. The methochloride and the methonitrate of the tetramethyl compound were practically equal to the hydrochloride; also, as in the case of the unsubstituted diaminoacridine, the effect in serum with the hydrochloride and the methochloride was practically equal. On the other hand, the methochloride and the methonitrate of the tetraethyl compound were much more active in serum than the hydrochloride.

Groups which Interfere with Antiseptic Action.

As has been seen, the introduction of methyl and ethyl groups into the amino radicals depresses rather than enhances the antiseptic potency, thus contrasting with the effect of similar substituents in the diamino- and the triamino-triphenyl-methane dyes. The substitution of one hydrogen atom in each of the amino groups by acetyl radicals practically abolishes the antiseptic action—for example, the sterilizing concentration of 2.7.diaminoacridine chloroacetate for *Staphylococcus aureus* in peptone water was 1 in 100,000 and in serum 1 in 200,000, and for *B. coli* in peptone water 1 in 20,000, and in serum 1 in 400,000: on the other hand, with the diacetylamino

derivative a concentration of 1 in 2,000 failed to sterilize. The carboxylic esters of 2.7.diamino-9.phenylacridine and of 2.7.tetramethyldiamino-9.phenylacridine were so weak as to indicate the marked depressing effect of the carboxyl group on the antiseptic property. The replacement of the amino groups by hydroxyls also led to practical abolition of antiseptic power, as is shown in the case of 2.7.dihydroxy-3.6.dimethylacridine, of which both the sodium salt and the methochloride were tested.

Comparative Efficiency for Staphylococcus aureus and B. coli.

Antiseptic potency for the two organisms does not invariably run parallel; thus the lethal concentration in serum for staphylococcus is 1 in 100,000, or higher in the case of 2.7.diaminoacridine hydrochloride (or sulphate) and methochloride and other analogous derivatives, 2.7.tetramethyldiaminoacridine hydrochloride and methochloride, 2.7.diamino-3.6.dimethylacridine hydrochloride and methochloride, 2.7.tetraethyldiaminoacridine methochloride, 2.7.diamino-3.6.dimethyl-9.phenylacridine methochloride, 2.amino-3.methylnaphthacridine methochloride. But in the case of *B. coli*, only the hydrochloride, methochloride and analogous derivatives of diaminoacridine and of diaminodimethylacridine and the methochloride of 2.amino-3.methylnaphthacridine reach this level of effectiveness.

Phenazine Series.

The following were tested:

Hydrochloride and methochloride (occasionally methiodide) of phenazine.
2.aminophenazine.
2.3.diaminophenazine.
2.dimethylamino-7.aminophenazine (methochloride only).
2.dimethylamino-6.methylphenazine.
2.7.tetramethyldiamino phenazine (hydrochloride only).
2.aminonaphthophenazine.
Also the methochlorides of 2.di-methylamino-7.amino-6.methylphenazine.
2.7.diamino-6.methylphenazine.
2.7.diamino-3.6.dimethylphenazine.
2.aminonaphtho-7.amino-3.methylphenazine.
2.methylamino-7.amino-3.6.dimethylphenazine, and methyltetrahydroquinoline-2.amino-3.methylphenazine.

The striking feature in this series is the relatively poor antiseptic power exhibited by the amino compounds in serum, especially for *B. coli*. The only compounds exactly comparable with the acridine series are those of the phenazine base, 2.7.tetramethyldiaminophenazine and 2.7.diamino-3.6.dimethylphenazine. The enhanced effect of the metho-compounds as compared with the hydrochlorides of the same bases is evident in the phenazine series; but is not so striking as with certain of the diaminoacridine derivatives. The relatively greater efficiency of the methochloride of 2.dimethylamino-7.amino-6.methylphenazine as compared with 2.dimethylamino-7.aminophenazine and of 2.7.diamino-3.6.dimethylphenazine as compared with 2.7.diamino-6.methylphenazine, suggests that methyl groups attached directly to the benzene rings may play a part in enhancing the antiseptic power in this series. For *Staphylococcus aureus* the methochlorides of 2.dimethylamino-7.amino-6.methylphenazine, 2.7. diamino-3.6.dimethylphenazine, and 2.aminonaphtho-7.amino-3.methylphenazine are powerful antiseptics, practically equal to the most potent of the acridine series; on the other hand, they are markedly inferior to the latter in their action on *B. coli*.

It cannot be said that the behaviour of the phenazine series throws any clear light on the antiseptic properties of the diaminoacridine group.

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SECTION OF OBSTETRICS AND GYNAECOLOGY.

Professor R. P. RANKEN LYLE, M.D., President.

DISCUSSION ON THE NEURASTHENIC ELEMENT IN MIDWIFERY AND GYNAECOLOGY.

OPENING PAPERS.

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I HAVE no exact acquaintance with functional nervous disorders and would find difficulty in describing them, but I know that neurasthenia is defined as nerve exhaustion and that the disease is not limited to women. It is not difficult to recognize cases of acute neurasthenia, but they come under the care of the physician and not of the gynaecologist, though we may get a neurasthenic patient with some uterine trouble, and it may be that the uterine trouble is a factor in the production of the neurasthenia. These are not the cases that trouble us; it is the "neurotic" woman with gynaecological symptoms that is the problem, and that is the kind of case we have to discuss to-day. It is difficult to define the adjective "neurotic" as the cases vary greatly in degree, from the highly-strung woman who is entirely obsessed by her own ailments and who has only slight evidence of pelvic disorder, to the patient who has some definite lesion in the pelvis which causes more distress than it would in a woman with a healthy nervous system—or perhaps we may say more correctly, as one with a normal mental equilibrium.

As gynaecologists I think we see comparatively little of hysteria, although by its very name that is the disease which indicates uterine trouble. On the other hand, we see many neurotic women with gynaecological symptoms. In the early days of my professional life these cases seemed to be very common. I think that the methods of treatment were largely to blame. The patients were in the habit of paying frequent visits to the gynaecologist to have pessaries inserted and changed, to have speculums introduced, to have applications made to the interior of the uterus by means of probes, or to have the cervix treated by silver nitrate, or douched or swabbed with iodine or phenol. I think it is no exaggeration to say that many neurotics were manufactured in this way. At the present day, with different pathology and treatment, the number of cases which are neurotic is greatly diminished.

Women are generally thought to be specially liable to functional nervous troubles, but this is a point open to discussion. There are special periods when such troubles are most likely to be manifest: (1) during transition from girl to woman; (2) during menstruation; (3) in the course of pregnancy and parturition; and (4) at the menopause.

I have little to say about (1); it is the age of development, and emotional disturbance is not uncommon, but some of the special troubles at this time are due to failure of or faults in development. In the last three of the periods mentioned we certainly find disturbing influences from which males are free.

(2) The menstrual period in the average woman is not associated with any great nervous disturbance, although in some cases there may be a little instability of mind or temper manifest at that time.

(3) As regards pregnancy and parturition, it is a striking fact that most women are not much affected nervously by these conditions. During the war we have seen how the nervous strain inseparable from life in the danger zone affected many of our bravest men, yet the great majority of married women go through the trials and discomforts of repeated pregnancy and the pain and dangers of several confinements with the nervous system undisturbed. I believe that the neurasthenic element as a disturbing factor in parturition is negligible, but a difficult or badly managed confinement may result in chronic local diseases which may lead to secondary nervous symptoms. In pregnancy the nervous balance is sometimes disturbed, and many of the minor troubles, such as morning sickness,

frequent cough, salivation, etc., and even some of the serious diseases, such as pernicious vomiting, chorea, etc., may be due to this fact.

(4) At the menopause there is a great physical change which may be gradual but is often more or less sudden, and in some this is associated with much nervous disturbance. The local changes are also responsible for symptoms which may be attributed to neurosis.

These special circumstances which I have just mentioned have to be considered when we try to arrive at a just conclusion in regard to the special liability of the female, as compared with the male, to neurasthenic troubles. A discussion on these grounds only would not be very profitable. It is better for practical purposes that we should try to fix what may be called the reasonable symptoms of any local ailment. It may be of advantage to consider first the symptoms, as apart from the physical signs, of gynaecological ailments. They may be divided into subjective and objective.

Subjective Symptoms.

(*a*) *Pain.*

Pain is a common symptom, but of course varies greatly with the individual. The neurotic patient as a rule complains most, but her pains are apt to be widely spread or variable in location, and often in a situation where they are difficult to explain on an organic basis. If we are to believe the textbooks, the most common kind of pain is *backache*, which is generally regarded as a real symptom of disease of the pelvic organs. Unfortunately, backache is one of the common symptoms (if I am not mistaken) of neurasthenia. From the gynaecological point of view I am inclined to rate backache very low in the scale of importance. It occurs in chronic pelvic peritonitis with thickened and adherent appendages; it is also, in my experience, the common symptom in chronic cervical catarrh; but it is rarely mentioned spontaneously by the patient who has a displacement (prolapse or retroversion of a heavy uterus) or endometritis (so called) or chronic metritis. And yet these are ailments from which the majority of the patients suffer who come for advice to the out-patient department or consulting room. In these cases, if the patient is asked whether she has any pain, and if so where, she will nearly always indicate the lower abdomen, sometimes one iliac region, sometimes both, sometimes, but not often, the hypogastric region. If the patient complains mainly of her back we should suspect a neurasthenic element.

It has generally been taught that *iliac pain* is due to ovarian trouble. I believe that the ovary is about the only thing in that region that never causes it. Many ovaries have been needlessly sacrificed on account of this teaching, and when the pain is on the right side the patient may be considered fortunate if her healthy appendix is not removed by some eager but not very observant surgeon. Every woman who has a heavy uterus which is prolapsed or retroverted or in a position of what may be called exaggerated anteversion will tell you of this iliac pain. I do not pretend to explain it, although it seems reasonable to suppose that it is due to a mechanical dragging on the broad ligament. The pain is never acute, and is sometimes only present just before or during the first day of menstruation.

Periodic pain is generally of the nature of *dysmenorrhoea*. I have noted that with the menstrual function there may be some nervous disturbance apart from any local disease, but these cases are not numerous and not very striking. The dysmenorrhoea of the neurotic is never very convincing; the pain is not definitely localized; it is never intense and it is very variable, and it generally lasts during the whole of the period. This is very different from the acute disabling pain that attacks some young women. This is definitely located in one or other iliac region. It occurs nearly always in the first few hours of menstruation and then disappears. Mid-menstrual pain is almost certainly due to some local trouble, but its cause has not yet been definitely ascertained.

(*b*) *Fatigue.*

Many of our patients complain of being very easily tired, or always tired. This symptom, of course, may be due to some constitutional trouble such as faults of digestion, or it may be a purely nervous symptom. But there seems good reason to believe that some cases are due to a sort of toxaemia. A striking example sometimes occurs in those cases of large fibroid tumour which diminish very rapidly after the menopause. This process is often attended by grave constitutional symptoms—rapid loss of flesh, changes in complexion, and digestive troubles. The results are often so striking that these cases may be diagnosed as malignant disease of the abdomen. I think this condition is produced in some way by the absorption of toxins from the rapidly disintegrating tumour. In fibroids in younger women the patient is often unduly tired, even when we allow for the weight of the large tumour and the effect of haemorrhage. The same symptom is common in cases in which the uterus is symmetrically enlarged by a chronic metritis. I think there are also conditions in the uterine mucosa and in the cervix which lead to a sort of toxaemia. It has often been stated that there is a relation between leucorrhoea and rheumatic troubles, and I have had cases which seem to prove that there is a distinct connexion between uterine catarrh and some skin eruptions.

(*c*) *Tenderness.*

When tenderness is caused by bimanual pressure on the uterus I think we may take it that there is some diseased condition of the uterus, if we can exclude a general hyperaesthesia of the skin. Cutaneous hyperasthesia is not a common symptom of gynaecological trouble. Even in acute pelvic peritonitis there is not generally the same marked tenderness and boarding that one gets in acute appendicitis.

Under this heading we may consider cases of dyspareunia or vaginal spasm. This varies very greatly in degree. The worst cases are undoubtedly in women of very neurotic temperament. But in others the trouble is associated with a definite local lesion. I have no belief in abrasions of the vaginal orifice or fissures in the hymen as common causes, and have always found that dissection operations and the subsequent introduction of dilators have failed to relieve, except in some minor cases which would probably have improved without treatment. On the other hand, I believe that a leucorrhoeal discharge from the cervix or uterine cavity is often associated with dyspareunia. When I have found this to be the case it is my practice to curette the uterus, and this treatment I have found to give much better results than any cutting or stretching operation; it also answers in cases where there is a tender retroverted uterus.

If we consider the symptoms which we have just mentioned I think there are certain indications as to those which are due to a purely neurotic cause and those which are the result of some organic trouble. We find the key to the problem in the relation of symptoms to physical signs. I think that backache, in the absence of cervical catarrh and hypertrophy, or of pelvic peritonitis with thickened and adherent appendages (or possibly of an enlarged and retroverted uterus), is generally a purely neurotic symptom.

If the patient suffers from iliac or hypogastric pain, and if we find on bimanual examination that there is an advanced stage of prolapse or a heavy and enlarged uterus, either anteverted or retroverted, and if the pain is aggravated or only present just before or on the first day of the period, we are justified in deciding that the pain has a definite local cause and in treating it accordingly.

In dysmenorrhoea, if we find that the pain is definitely located in one or other iliac region (or in the hypogastrium); that it is very intense, but only lasts for a few hours at the beginning of menstruation; that the patient also gives a history of prolonged periods or of metrorrhagia or leucorrhoea; and if with these symptoms we find an infantile type of cervix and an acute flexion (ante- or retro-) of the body, the case may be removed from the purely neurotic category.

Objective Symptoms.

There are some other symptoms, commonly met with, in which the question arises whether they are indicative of organic mischief, or purely nervous.

(*a*) *Bladder Troubles.*

1. *Incontinence.*—The incontinence of young women is met with as a purely neurotic symptom, or at least as a symptom in which we are unable to find any local changes. These cases are nearly always amenable to moral treatment; removal to a nursing home or to a hospital is nearly always all that is required to cure them. Another class of

case occurs in middle-aged or elderly women who complain of inability to control the bladder. Some of these cases are due to cystocele; as the bladder and vaginal wall are very thin and the bladder lies at its lower part unsupported, any little pressure from below is sufficient to cause the urine to be expelled involuntarily. These cases can be cured by operative treatment. It is not necessary to refer to the incontinence which is due to fistulae or to over-distension of the bladder.

2. *Retention of Urine.*—This occurs as a nervous symptom after operation, and it is sometimes met with as a symptom of hysteria. We have to remember its occurrence in cases of gravid retroversion, and of impacted tumour in the pouch of Douglas.

3. *Increased Frequency of Micturition.*—This may be due to nervous causes or to inflammation or other disease of the bladder. We have especially to bear in mind that infection by the *Bacillus coli* is a common cause of frequency of micturition. Irritable bladder is quite common in women who suffer from gynaecological ailments. It is sometimes a symptom of a bad tear in the cervix which has involved the lower part of the broad ligament. As a result of this tear and consequent inflammation we find a firm scar or band which obliterates the lateral fornix, and pulls the cervix towards the affected side. The presence of this scar seems to limit (reflexly or otherwise) the capacity of the bladder. Division of the scar and a plastic operation will relieve the trouble. Another cause of frequent micturition is found in elderly women who are suffering from atrophic changes in the vagina, associated with senile vaginitis and sometimes with cystocele. This symptom may be very troublesome, but a diagnostic point is that the trouble occurs chiefly during the day-time, and the patient is not disturbed much at night. The condition of the urine will distinguish between cystitis and what may be called reflex bladder irritability. In cases where there is actual cystocele an operation may be required, but in other cases I have found that when sedative lotions used as a douche fail to relieve, the condition may be cured by a very thorough disinfection of the vagina under an anaesthetic.

(*b*) *Irritation.*

A similar method of treatment is very successful in some cases of *pruritus vulvae.* As itching and burning are subjective symptoms it may seem that this disease should have been dealt with in an earlier part of this introduction, but the redness, swelling, and excoriation of the external parts are very definite signs. Apart from those cases which are due to diabetes or parasites or leucoplakia, pruritus vulvae is generally regarded as a nervous disease, and it has been recommended that the nerves underlying the affected area should be divided. I have never found this necessary. In elderly women a vigorous disinfection, such as is usually undertaken after the patient is anaesthetized in operations on the vagina, is all that is required. In younger women, and especially if there is any sign of leucorrhoea or cervical catarrh, it is advisable to curette as well as to disinfect.

(*c*) *Amenorrhoea.*

Amenorrhoea is quite frequently produced by nervous causes; any mental shock or great anxiety may cause it. Perhaps the most common instance is the case of the unmarried woman who fears she is pregnant. The intense longing for a child on the part of a married woman may also bring about amenorrhoea. There is also the well-recognized group of cases in which scanty menstruation or amenorrhoea seems to be caused by deficient thyroid secretion.

(*d*) *Phantom Tumour.*

Very great distension of the abdomen may be a purely hysterical affection, but this can rarely give rise to any difficulty in diagnosis. A more common form of distension is that which is known as pseudocyesis or spurious pregnancy. It may appear before the menopause and when the periods are normal or only slightly diminished, but it is generally met with in patients who are passing through the menopause. Although these cases are now attributed to the influence of the ductless glands I think there is little doubt that there is also a nervous factor in their production. I think the same may be said of many other troubles of the menopause when these are exaggerated.

(*e*) *Enteroptosis.*

I have left this condition or group of symptoms till the end, as although it is generally considered to be one of the most common causes of neurasthenia in women it is not confined to women, nor is it a gynaecological symptom. It is true that with the descent of the abdominal contents we may have associated a prolapse of the pelvic floor or uterus, or a retroversion, but these are not outstanding features in the general clinical picture. As to the cause of the condition, I think it is open to doubt whether the origin of the trouble lies in the descent of the organs, or in the neurasthenic element, or in a general toxaemia. An investigation into its causation would be out of place here, but I may state that I am no believer in the mechanical theory of disease. Most of the abdominal organs may be displaced to an extreme degree without anything more than some inconvenience to the patient. I have seen cases in which an umbilical hernia reached half-way down a patient's thigh, and of prolapse of the uterus with complete eversion of the vagina, and in these the only complaints were a somewhat disagreeable dragging and a difficulty of locomotion or of sitting.

Diagnosis.

I have little to add to what I have already said under the various divisions of the subject. I must emphasize again the point that the key to the problem as to how far the nervous element enters into a case is to be found in an accurate knowledge of the physical state of the pelvic organs. In the majority of cases this involves long practice in bimanual examination. Unless one is able to distinguish comparatively small differences in the size and general characteristics of the uterus and other pelvic organs, one is handicapped in coming to a decision.

What we have to decide in each case is: (1) Are the symptoms such as are generally found in a given lesion? (2) If the symptoms are exaggerated, is there reason to suppose that they will be relieved or removed by local treatment? or (3) Is the neurotic element so pronounced that local measures are likely to end in failure?

Treatment.

Because a patient is neurotic that is no reason why definite gynaecological troubles should not be treated. It may even be that the local trouble is the origin of the neurosis, or at least intensifies it.

1. *Palliative.*

Where palliative treatment alone is indicated, care must be taken that it is of a kind not liable to aggravate the nervous tendencies.

I think it would be well if treatment of patients in the out-patient room and consulting room were abolished. The passage of a speculum is unnecessary, except on the rarest of occasions, to anyone who has sufficiently developed the sense of touch. The uterine sound should never be used except during an operation. Applications to the cervix should be abandoned.

I have long ago regarded pessaries as nearly always useless and generally harmful. I know that there are women who think they cannot do without them, but I believe that nearly every case of this kind is merely an example of cure by faith. There are still some who seem to regard them as a panacea for all gynaecological troubles. If these cases be examined some curious conditions will be found. One finds them in cases of unreduced retroflexions, or of tumours or inflammatory swellings in the pouch of Douglas; Hodge pessaries where the uterus is anteverted; ring pessaries so small that they can do neither harm nor good, and pessaries in cases of senile vaginitis in which the patients have the feeling of prolapse but where no prolapse exists. Most of these patients have been educated into the habit, and I have found that most of them can be educated out of it. A woman who has a prolapse of a moderate degree is generally as comfortable without a pessary as with one.

Rest may be necessary where there is evidence of inflammatory trouble, or it may be advised as a general measure with overfeeding and massage for the neurasthenic condition, but many neurotic patients rest too much.

The use of a vaginal douche is advisable in some cases, such as those in which there is leucorrhoea accompanied by irritation; in these cases some sedative lotion may be

used, such as weak subacetate of lead. Hot douching every night is useful in cases of inflammatory exudation. Douching as a regular procedure where none of these conditions exists is probably harmful. The use of tampons, I think, has largely gone out, and I doubt whether they have any great curative effect.

Some gynaecologists get rid of responsibilities for a time by sending their patient to have a course of baths at some Continental or British spa. From a neurasthenic point of view this may be of some use; as regards the cure of any local pelvic ailment, except those which are due to some old inflammatory trouble, I think there is nothing to be said for it.

2. *Operative.*

The neurotic element must make us more guarded in our prognosis and more reluctant to operate. The objective symptoms of disease are a much safer guide here than subjective symptoms. In certain cases there can be no doubt as to the necessity for operation, however severe the neurotic element, such as in ovarian and most fibroid tumours, or pelvic inflammations. Where the local condition is one which is likely to affect the general health an operation is advisable. This will include cases of prolonged or profuse haemorrhage, of leucorrhoea, and cases in which a toxic element seems to be present. This class of case is fairly hopeful. The operations required for these conditions may be of a minor character, such as curetting, removal of a polypus, or excision of a catarrhal cervix, or they may involve an abdominal section with removal of ovaries and tubes or uterus. We may feel bound to give our patients the chance of better health in this way, but we must be prepared for a certain amount of disappointment.

The one class of case which I think is the least promising is that of a so-called displacement of the uterus—a case in which the uterus is retroverted but is not enlarged and in which there are no symptoms but backache. How many cases one has seen of women who have had this condition as part of a general enteroptosis, and who have had ventrofixation performed with no relief! I have known instances in which a kidney has been fixed, the uterus has been fixed, and, lastly, the colon has been fixed, and the last state of the patient was worse than the first.

A word must be said as to moral treatment. Many neurotics are amenable to the influence of a plain talk. Some of them have been frightened—or have been led to regard some slight ailment as a matter of great importance—and an emphatic reassurance may help a great deal. In very aggravated cases it may be necessary to explain to the patient that her troubles lie mainly in her own mind, or even to point out that she is wasting the best part of her life and is a burden to others, and that the cure rests with herself. It is not a pleasant duty or one which is likely to make the doctor popular with his patient—for the time at least—but I have known it to be effectual in some bad cases. It is especially successful in those in which an operation has been really advisable and has been performed. The period of convalescence is a favourable time to explain these things.

I have said nothing of psycho-analysis. I have my own impressions of this method of treatment, but have no experience of it. In any case it seems to be outside the sphere of the gynaecologist.

II.—E. FARQUHAR BUZZARD, M.A., M.D., F.R.C.P.Lond.,

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DEPRESSION, insomnia, or disordered sleep, loss of energy loss of sense of proportion and of mental perspective indecision, irritability, or over-reaction to various forms of stimulation and restlessness, are the most important and most universal indications of the neurasthenic state.

But this picture of neurasthenia is far from being complete, and the canvas may exhibit features which by their prominence throw the common background into obscurity. The breakdown of organized control too frequently permits exuberant growth of certain elements in the patients' composition which have hitherto been kept in subjection, and which now manifest themselves in unmistakable fashion. Anxieties, fears, and obsessions, springing from foundations buried in the past, slowly or rapidly assume proportions which gain for them the credit or discredit of being the primary causes of ill health. Moreover, these secondary eruptions frequently exhibit a physical bias and are projected in the form of pain, discomfort, or disturbance of function on one or other organ or region of the body.

Herein lies the difficulty of the gynaecologist, the surgeon, or the physician. The last may be confronted only with a mental disorder in the shape of a phobia, and may be in no doubt as to the method of treatment he should adopt; the first may be asked to deal with a pain or disorder of function referred to a pelvic organ, and may find the greatest difficulty in deciding whether the symptoms are primarily mental or primarily structural in origin. The answer to this question is often of great importance and mistakes in treatment may be of lasting effect.

From the gynaecologist's point of view it is obvious that he must satisfy himself as to the presence or absence of any structural defect to which pain or disorder of function can legitimately be ascribed. In the absence of such, or in cases of doubt, the question of neurasthenia may be raised, and he must be in a position to assess the likelihood of its presence. In other words, a correct diagnosis must precede and guide his treatment.

It is not sufficient to rely on a general statement or history to the effect that the patient is or is not neurotic, or on the presence or absence of an obvious source of worry or anxiety. Some of the most difficult cases of neurasthenia are those in which the patient has earned the reputation for not having a care in the world and for possessing a most equable temperament.

To arrive at a decision it is imperative not only to be familiar with the symptoms of neurasthenia, but to have some knowledge of the causes underlying this condition and its secondary manifestations. Before considering these in detail may I remind my audience that more than one factor is always concerned in the production of any morbid condition? It is usual for a bruise to follow a blow, but there are blows so slight that they only produce bruises in one person out of ten. That person is said to bruise easily, words implying a causative factor which operates in addition to the blow and which belongs to the individual. If this simple example of cause and effect is complicated by more than one factor we must not be surprised if we find a very large number of factors concerned in the production of neurasthenia. Anybody who is satisfied with one cause for neurasthenia, whether it be psychic, septic, static, or endocrinic, must inevitably come to grief in diagnosis and in treatment.

The first point to be studied in considering the etiology of neurasthenia is the inherent factor. As doctors, in our attempts to classify and pigeon-hole our patients we are apt to overlook individual differences. Go to a girls' school with a hundred pupils and you will not be surprised to find that each girl differs from her neighbour in form and feature; indeed, you would be surprised to find any two so alike that you could not distinguish them after a very short interview. Let us remember that the mental form and feature of each girl is equally if not more characteristic, that each responds in her own way to a common environment, and that in each the relative influence exercised by primitive instincts and desires is materially different. Let us recognize, too, that each girl is not equipped with the same amount of nervous energy even when allowance is made for transient conditions of health.

An appreciation of this last fact enables us to understand some of the early neurasthenic states met with in schoolgirls, in view of the fact that they are all put through a régime suitable only for the most robust. How often have we heard from the lips of a woman that while at school she never knew what it was to be tired! But public opinion at the school denounced manifestations of fatigue as reprehensible, and it was up to the exhausted individual either to be branded as a slacker or to assume a cheerfulness and vivacity which was purely fictitious. A third alternative, in the form of some hysterical disability or disorder of function, might provide a line of defence against the discomfort entailed by either of the other two courses.

A consideration of these factors in gynaecological problems at the period of puberty and adolescence may afford a clue to diagnosis and treatment. From a neurological point of view such a combination of factors, associated with a strong primitive instinct of acquisitive or sexual

character, may lead to disorders of conduct which may have disastrous results on the patient's whole life should the underlying and temporary causes escape recognition.

While insisting on the importance of realizing the inherent differences between individuals, I have intimated that fatigue—in itself a variable quality in regard to the amount of energy expenditure required to produce it—is a predominant factor in many neurasthenic conditions. Modern psychology, from which we have gained such invaluable knowledge in regard to mental mechanisms, has perhaps underrated the influence of fatigue in bringing about disorders of mind, and of rest in their treatment. This neglect represents the swing of the pendulum from the fashion of treating all functional disorders on the Weir Mitchell system, and so disregarding their other component factors. There can be little doubt that when a breakdown occurs in the compromise between social ideals and primitive instincts as the result of fatigue, rest may be sufficient in some cases to restore the balance, and in most cases it forms a necessary part of successful treatment.

From the gynaecological outlook the influence of fatigue and rest has many bearings. The intricate question of pain is not the least of these, and we must recognize the principle that visceral sensations normally giving rise to little, if any, disturbance of consciousness, and without any disagreeable tone, may assume painful qualities when the higher sensory centres have lost their healthy influence and authority. This principle is one to which we admit our adherence in ordinary good health when we acknowledge the exaggeration of some chronic pain in the presence of fatigue. In my belief there is no such thing as imaginary pain, but sensations may acquire a painful aspect when the higher centres are out of gear.

Fatigue is also closely concerned with sexual functions, and in women may manifest itself in precisely opposite ways. In a woman with a feeble sexual instinct the effect of fatigue may abolish desire altogether, and so create another factor in the evolution of a neurasthenic state. In another woman with strong sexual instincts fatigue, by interfering with the authority normally exercised by higher centres, leads to sexual misconduct of a kind which is regarded by the same individual in a healthy condition with abhorrence. Restoration of normal control may often be effected in such patients by rest alone.

But when we are dealing with the results of fatigue it is essential to find out whether there is more than one leakage by way of which nervous energy is being drained. The most common result of such investigation is to discover two factors which the patient regards as antagonistic or antidotal, but which in effect are cumulative. These two factors may be roughly described as fear and flight. The patient is beset by a conflict which she finds insoluble, and which she dare not face. Refuge from this dread is sought in distraction, often in frivolity, which in itself is a potent additional source of fatigue. The greater the exhaustion the firmer hold does the conflict obtain. Sleep is interfered with, and a complete breakdown is the result.

Many such patients must seek help from the gynaecologist on account of some pain or disorder of function, which in a healthy individual he would easily and successfully deal with. His intervention, however, whether operative or otherwise, has not the desired result, and unless prolonged and adequate rest, both mental and physical, can be obtained the patient's condition becomes worse rather than better. General and gynaecological surgery would show more successful results if every patient, before being submitted to a non-imperative operation, were carefully scrutinized from this neurological standpoint. I confess to having little patience with the surgeon who prides himself on the rapidity with which he gets his patient up after operation, or with the obstetric physician who lays down a time limit for rest after confinement regardless of what has gone before.

In considering the etiological factors concerned with neurasthenia reference must be made to the influence of age. Much importance has naturally been attached to changes which take place in the reproductive organs of women at the age of puberty and at or about the climacteric, and speculation has been rife in regard to the effects of these changes in the production of mental instability.

The conclusions generally arrived at can hardly, in the present state of our knowledge, be accepted without reserve, and the habit of attributing in an offhand manner neurasthenic symptoms to the patient's age, as if there was nothing more to be said, is one to be deprecated. We must recollect that many individuals pass through the "dangerous ages" without exhibiting any signs of mental disturbance in spite of the change in their internal secretions, and we must not forget the psychic stress which so often operates at these periods of life. Reference has already been made to some of the difficulties which beset the schoolgirl, and these may be increased if the onset of puberty has found her unprepared by judicious education and enlightenment.

In my experience the large majority of adult women who exhibit symptoms of neurasthenia are between 35 and 45 years of age, and most of them have seen no signs of the approaching climacteric. It is at this period in a woman's life that mental stress is most apt to develop. Her energy is sapped by larger responsibilities, her place is being filled by younger women, and unless she is able to adapt herself to a new outlook on life she may find herself ill-equipped to face the years of declining power. The married and the single each have their own particular difficulties and anxieties, sufficient, as it seems to me, in most cases to account for the disorders of mental function which so often overtake them, without invoking the influence of glandular disturbances.

Civilized conventions have imposed on woman the necessity for greater repression than they have on man, with the result that we are often confronted with stories of many years of mental suffering quite unsuspected by friends or relatives. The strain of such years is apt to take its toll on the nervous system and to result in neurasthenic states which are quite unjustifiably ascribed to a physiological event.

It is more than likely that the menopause is a factor of some importance in a small proportion of patients, but I am not prepared to assess its value at the height it has attained in popular belief. Moreover, it has not been my experience to find a menopause artificially produced followed by neurasthenia in the absence of other more important factors.

The influence of age is so closely allied to that of the endocrine glands that a brief consideration of the latter, especially in relation to treatment, may not be out of place. I am hoping to hear in the course of this discussion the results of gynaecological and neurological experience in regard to the use of glandular preparations in the treatment of neurasthenia. They have been extensively used in men and women of all ages, and it would be interesting to discover the general opinion as to their efficacy. My own contribution to such a discussion can be stated very briefly. Beginning with an unfounded but enthusiastic bias in favour of their administration I have entirely failed to satisfy myself that they are of any therapeutic value in dealing with neurasthenia as such. There have, of course, been instances in which obvious thyroid inadequacy has been met successfully by the prescription of the appropriate gland, but I cannot recall a single case in which extracts of mammary, ovarian, or orchitic origin have indubitably exercised a curative effect. This statement must not be regarded as a condemnation of their use so much as a confession of ignorance as to how to use them.

Reverting to etiology, let me say a few words on what appears to be the most important factor in neurasthenia as it affects the patients of the obstetrician and gynaecologist. The instinct of self-preservation with its emotional counterpart of fear must certainly hold this place. Speaking generally, this instinct and this emotion are well developed in women from an early age, although they are not often brought into prominence in the everyday life of civilized communities. Moreover woman's fear of known dangers may not be more easily evoked than that of man. She is trained from an early age to repress fear in its relation to a number of more or less unknown contingencies. The fear of menstruation, the fear of sexual intercourse, the fear of child-bearing, the multiple fears associated with the responsibilities of maternity, and later on the fear of disease, of malignant disease, in connexion with the mammae and the pelvic organs. My experience amongst neurasthenic women leads me to believe that these fears, concealed from the eyes of the world, form a considerable part of the mental content of many so-called neurotic women, that they are based on unnecessary ignorance and lack of education, and that their dissipation would simplify to a large extent the work of the gynaecologist and

neurologist. Only recently I was consulted by an immaculate spinster of 47 years of age who had for months been nursing an agony of fear that she was about to give birth to a child, and on inquiry she was found to be entirely ignorant of the steps necessary before that fear could be realized. Such a story is hardly credible, but less improbable ignorance is constantly being exposed in consulting rooms.

But in proportion to the fears confessed, how many are never divulged except in the form of what one may term pelvic neurasthenia? It may justifiably be hoped that the emancipation and better education of women will result in the abolition of those phobiae which depend on ignorance of physiology, but the terror of malignant disease seems likely to remain a curse to the peace of woman's mind for years to come.

The influence of fear concerns the gynaecologist in another way, in that it induces the nervous patient to conceal the early signs of disorder of function lest they may be pronounced to be evidence of disease. Thus does the instinct of self-preservation, lacking the guide of knowledge, defeat its own ends.

DISCUSSION.

Dr. BELL (Humshaugh) considered that some, at all events, and probably many, of the morbid nervous states of married women, were due to the impressions made on the nervous system by the fear of the pain of childbirth and its unaccustomed and unpleasant concomitants, and to the recollection afterwards, this being more marked in reticent natures. This fear and recollection could be abolished entirely by the use of scopolamine-morphine narcosis. So much was this the case that in succeeding pregnancies there was no fear of this kind, whereas, if neither chloroform nor scopolamine-morphine had been used, there was often terrified anticipation of approaching labour which produced very disastrous effects on the whole nervous system both then and afterwards.

Dr. WM. ROBINSON (Sunderland) looked forward to the day when neurasthenia would no longer be classed as a neurosis—to the time when the seat of the disease would be definitely located in some portion of the brain, just as paralysis agitans had been shown to be due to a visible progressive change in certain cells of the corpus striatum. At present most of the literature of neurasthenia was taken up with a medley of all sorts of weird symptoms referred to one or more organs of the body, due to loss or perversion of nerve control. It was not, however, to be expected that a marked change would be found in the nerve cells of the brain in a disease which might be temporary and curable; these changes might be abnormal biochemical reactions occurring, perhaps, as the result of the action of defective or excessive chemical messengers (hormones) carried to them in the blood stream from one or more of the ductless glands. It was impossible to imagine a function apart from a physical basis, and there was no system of the body in which function depended more upon structure than it did in the nervous system. Intelligence itself depended upon the number and development of the neurones in the four superficial layers (the plexiform and the three pyramidal cell layers) situated above the granular layer in the cortex of the brain, as was shown by their great development in man, and their late development in the individual and in the race. Instinct was a function of the three subgranular layers, and soon after birth these layers were developed to the extent of 82 per cent. (see Berry in BRITISH MEDICAL JOURNAL, July 16th, 1921, p. 72). The high development of the supragranular layers and the great size of the association areas surrounding the various special "centres" were the most prominent features of the human brain. Intelligence and fitness depended upon the number (and quality) of the neurones present at birth. Though they never multiplied, they and their connexions might be developed to a limited extent by education. Hysteria being an emotional disease, and its chief characteristic suggestibility (both as to cause and cure), was doubtless a disorder of these higher neurones; so was psychasthenia with its "phobiae" and its hereditary character; but neurasthenia, being a chronic depression of various general functions of the body, was most probably a disorder of those subcortical centres which regulate the general economy. Thorburn classed ordinary acute shock (in which there was also an arrest of mental activity and volition) as acute neurasthenia; and chronic neurasthenia as a condition of chronic shock. The predominating part (Dr. Robinson continued) that the sexual functions play in the body and the mind, especially in persons with defective control, accounts for the frequency with which neurasthenia is met by the gynaecologist. To get and to beget are the two strongest passions. The easily developed fatigue and prostration of the disorder suggest a likeness to Addison's disease and the possibility of its being due to deficient action of the suprarenal glands, especially when we remember that the other two chief symptoms of Addison's disease—pigmentation and vomiting—have never been produced by experiments on that gland and are most likely due to implication of the solar plexus, since they occasionally occur in chronic tuberculous peritonitis. The frequent vasomotor symptoms in neurasthenia show its intimate connexion with the sympathetic nervous system. We know that that system, acting through the splanchnics, can immediately produce those defensive responses in an animal when suddenly attacked and in great danger, which later are brought about by a flow of adrenaline, after the suprarenals have had time to act (Cannon). This is not surprising when we recollect that developmentally the medulla of the suprarenal is an offshoot of the autonomic system. The "phobias" and "anxieties" suggest some hyperthyroidism, symptoms of which are those occurring in fear and fright; and fear and fright are potent causes of neurasthenia. That the treatment of neurasthenia by organic extracts has been disappointing may be due to our ignorance as to the gland or glands required and the dosage necessary. The treatment of neurasthenia demands, as Osler stated, (1) a strong personality in the doctor or nurse; (2) certain means to be employed—a hospital, a home, an electric battery, a dominating suggestion, the correction or cure of some local (for example, pelvic) trouble, etc.; and (3) faith on the part of the patient—"only believe."

Dr. HELEN BOYLE (Brighton) confessed that she felt in a maze. Neurasthenia was such a vague term. Dr. Farquhar Buzzard's definition, "A disorder of mind wherein normal activities of life are difficult or impossible," made it almost all-embracing. She was impressed by two things: (1) By the very marked influence of the monthly period upon nervous and mental patients, usually, though not always, for ill. This had been questioned, but in her experience was incontrovertible. In the early stages of such conditions it was not uncommon for patients to develop suicidal tendencies, which completely disappeared when the period was over. This was misleading, as a cure might be postulated and a recurrence of the symptoms occur at the next period. (2) By the effect of lactation on the nervous mechanism. It was her experience that the stopping of lactation before the usual term of eight to nine months was likely to promote, not to hinder, the development of nervous symptoms. She thought that, unless it was otherwise impossible, lactation should be encouraged, not checked, in patients showing signs of nervous instability. She would like to know whether members of the Section had found excessive sex feeling to follow abdominal operations, and whether in such cases, in the absence of other indications, it was wise to have the abdomen explored for adhesions.

Mr. R. J. JOHNSTONE (Belfast) thought that neurasthenics might be divided into the hypochondriacs, who were usually people with too little to do, and the women who were suffering from the exhaustion produced by the bearing and rearing of a large family. He was in favour of ending the second stage of labour, especially in primiparae, as rapidly as possible, as many women after a long first confinement suffered from neurasthenia for a considerable time. He always impressed on patients after operation, especially after an abdominal operation, that they should not attempt to lead an ordinary working life for at least six months. He emphasized the importance of making certain, by operation if necessary, that no organic lesion existed which was really responsible for the symptoms of which the patient complained, and confessed that it was always with reluctance and a sense of failure that he finally arrived in any given case at a diagnosis of neurasthenia.

Dr. P. H. PARAMORE (Rugby) discussed the relation of the pressure within the abdomen to neurasthenia. He believed that neurasthenia was a condition affecting the

whole body. There was an enfeeblement of the brain (higher centres), of the systemic musculature, and of the viscera. The power of response of the brain depended on the nutritional state of the brain; and this nutritional state (apart from other factors) had resulted from the blood supply to the brain. The nutritional state of the brain was thus due, for one thing, to an adequately high aortic blood pressure—that was to say, to an adequate output of blood from the heart into the aorta per unit of time. But the output of blood per unit of time from the left ventricle depended on and varied with the supply of blood to the right auricle during the same time. Thus the nutritional state of the brain depended, for one thing, on the flow of blood *to* the heart. This blood reached the heart from three regions—from the skull, the limbs, and from the abdomen; but the skull was incompressible; the volume of the limbs varied but little from time to time; only in the abdomen did large variations in volume occur. If the musculature of the abdominal wall was persistently lax, as it often was in these cases, then disturbances in the vascular supply to the brain, and so of cerebration, were to be expected. The good effect of treatment by abdominal supports, rest, etc., the non-appearance of neurasthenia during pregnancy (indeed, the disappearance of neurasthenia in non-pregnant women when pregnancy ensued), and its easy rise in thin and worn-out people (especially its common occurrence in such women who had borne children), all indicated a relation between the intra-abdominal pressure and neurasthenia. Unlike Dr. Donald, Dr. Paramore believed many diseases were caused mechanically; and he believed that the mechanical failure of the abdominal wall and of the other associated musculatures to compress the abdominal visceral mass sufficiently was a cause, and he thought a potent cause, in the production of neurasthenia. The case referred to by Dr. Donald, in which a large fibroid gradually dwindled at the climacteric and the patient lost flesh and became neurasthenic, was, he thought, to be explained, at least in part, by the fall of intra-abdominal pressure rather than by the onset of a toxaemia induced by autolysis of the tumour, as Dr. Donald suggested.

Dr. MARY STURGE (Birmingham) urged the importance of restoring to their proper level in the body such displaced organs as the kidney and uterus, in order to eliminate an important factor in the cause and upkeep of neurasthenia. An experience of twenty-five years had profoundly impressed upon her mind the benefit that accrued to a nervous or even mental patient by relieving her of the strain produced by misplaced organs, if such existed. She related some typical illustrative cases. In one, a young woman who became excited and almost suicidal at each menstrual period, the fixation of a loose kidney in its place was followed by rapid and permanent cure. In another case puerperal melancholia showed no signs of improving until the heavy retroflexed uterus was replaced; permanent recovery rapidly followed. She advocated care in the early reposition of displaced organs as a preventive of neurasthenia.

The President (Dr. RANKEN LYLE) said that the Committee of the Section had selected the subject for discussion because many patients suffering from exactly the same symptoms and physical signs received very different treatment, according to the way their cases were viewed by the practitioner or gynaecologist. He was not referring to cases of abdominal tumours, where the indication for operation was perfectly obvious and where little or no doubt could arise as to the proper method of treatment, but rather to a large class of cases where patients possessing some minor physical abnormality were at the same time suffering more or less from the general symptoms of neurasthenia. Twenty or thirty years ago all these cases fell into the hands of a person known as the gynaecological physician, who treated them by the insertion of various pessaries, and all sorts of minor treatment, such as applications to the cervix, tampons, douching, etc., and sometimes applications even to the interior of the uterus. This treatment resulted in the manufacture of a large number of chronic neurotics. A few years later, owing to steadily improving results obtained from operative treatment in general, this class of case gradually came under the notice of the operating surgeon or gynaecologist, who generally regarded the gynaecological physician with great contempt, and in some instances went so far as to call him a "pessary monger"; but the operating surgeon himself was even more to blame, for he generally spent his time doing innumerable operations, such as Alexander-Adams's operation, ventrofixation and suspension, Gilliam's operation, trachelorrhaphy, and operations for the repair of minor lacerations of the perineum—operations which could not benefit the patient in any way whatsoever; the pretext for performing them was the false assumption that the minor physical abnormality found was the cause of the numerous neurasthenic symptoms of which the patient complained. What the Committee was anxious to ascertain was not so much the treatment of such cases, but the differential diagnosis and the relation, if any, between the mental or neurasthenic symptoms and the physical signs, so that patients of a typically neurasthenic character would not be subjected to unnecessary operations, and that the operative part of gynaecology would be reserved, as far as possible, only for those cases in which the benefit to the patient would be obvious and definite, and not of a purely speculative character. All, he thought, would agree that Dr. Donald had treated the subject in a masterly way, and had indicated many symptoms which were essentially of a neurasthenic character—some that might be either neurasthenic or have a physical basis, and others entirely due to physical causes. A point on which Dr. Lyle wished to insist was the great necessity for disbelieving all the objective symptoms complained of by a patient until they were verified by a careful examination. Patients often complained of all sorts of discharges, especially purulent discharges, when on examination nothing abnormal could be found. Other patients complained of uterine prolapse or displacements, or other conditions which had no existence in fact; the only explanation of these cases was a mental fear or dread lest they might perhaps develop. Dr. Buzzard's paper illustrated this fact—that many of the symptoms complained of by patients were due primarily to fear and dread, and he thus showed the absolute necessity of a thorough investigation in each case to determine the origin of such symptoms, whether due to fear or some departure from the mental or nervous equilibrium, or due to physical signs. Dr. Paramore mentioned increased intra-abdominal pressure, but this condition, apart from abdominal tumours, was essentially due to neurasthenia, and was associated with the neurotic bad habit known as "bearing down." This was the actual cause of the descent of the pelvic floor, producing such conditions as prolapse, procidentia, cystocele, and rectocele; the unsatisfactory results from operations in such conditions was due to the fact that their origin was more mental than physical.

Dr. FARQUHAR BUZZARD, in replying, thanked the members of the Section for their reception of his paper. He was sure that Dr. W. H. Paramore would have felt a glow of satisfaction if it could be asserted that pregnancy was never complicated by neurasthenia. This, unfortunately, was not the case, and if Dr. Paramore's theory were followed to its logical conclusion every woman after bearing a child should become neurasthenic and in the case twins become insane!

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

EXTRACTION OF PIN FROM RIGHT BRONCHUS IN A CHILD.

A GIRL aged 3 was referred to me by Dr. Jeffrey Ramsay of Blackburn, with the history that in the evening of May 18th, 1921, she had told her mother that she had swallowed a pin. She had been holding some pins between her teeth and one of these had slipped down her throat. There was no cough or difficulty in breathing, but *x*-ray examination was advised by Dr. Jeffrey Ramsay. Dr. F. W. Taylor reported the same evening that the radiogram showed a pin in the right bronchus, obliquely placed with the point on a level with the sixth costo-vertebral articulation and the head between the seventh and eighth ribs, about ¾ in. from the spine.

The following day, under chloroform anaesthesia at the Blackburn and East Lancashire Royal Infirmary, a 6 mm. Brüning's tube was passed into the right bronchus. This was replaced by an 8 mm. tube, as the smaller size did not give

a satisfactory view of the parts in so young a patient. Spasm met with while attempting to pass the tube between the vocal cords was overcome by painting the interior of the larynx with a weak solution of cocaine (5 per cent.) used sparingly, and then waiting a few minutes, when the procedure was easy; trauma of the larynx was thus avoided. After a considerable time—about thirty minutes—spent in searching the walls of the right bronchus, the point of the pin was found projecting from the posterior wall at a distance of 11 in. (from the teeth to the end of the extension tube of the bronchoscope). The distance of the foreign body from the teeth in so young a patient, the position and direction of the pin point, and the required backward tilting of the end of the bronchoscope to engage the point of the pin in the lumen of the metal tube all suggested that the head and at least the greater part of the body of the pin were in a posterior secondary bronchus, although the small diameter of the bronchi prevented one from being certain about this point.

After location extraction was easy, the removal being effected through the lumen of the bronchoscope with an angled variety of Brüning's forceps. There was no difficulty with the anaesthetic and the breathing during the operation. The recovery was uneventful, except for a slight hoarseness which disappeared within two days.

Although removal of foreign bodies from the lungs is of frequent occurrence nowadays, this case is recorded for the following reasons:

1. The patient presented no symptoms of irritation of the air passages, not even the "asthmatoid wheeze" described by Chevalier Jackson, although this, it is true, is to be expected more when the foreign body is of sufficient size to act as a ball valve in the air passages. In spite of this fact, the proper method of approach was taken in this case. No doubt if left alone foreign bodies in the air passages may lie quiescent for years, or may be coughed up later, but too often a fatal result ensues.

2. Early diagnosis and treatment in this case, with bronchial irritation absent, no doubt had much to do with the fact that tracheotomy was not necessary to relieve respiration either before, during, or after the operation. For a similar reason low tracheotomy with introduction of the bronchoscope through the tracheal wound was not required.

3. The pin was extracted through the lumen of the bronchoscope because the point could be brought into the lumen before using forceps. When a pin lies with its axis across the end of the bronchoscope, removal of the forceps, pin and bronchoscope *en masse* may be necessary.

W. Barrie Brownlie, M.D.Glasg.,
F.R.C.S.Edin.,
Ophthalmic and Aural Surgeon, Blackburn and East Lancashire Royal Infirmary.

ADRENAL AND PANCREATIC HAEMORRHAGES FOLLOWING OPERATION.

A healthy breast-fed baby, aged three weeks, was admitted to the Queen's Hospital, Bethnal Green, for hare-lip. A short operation was performed under open anaesthesia by equal parts of chloroform and ether. Five hours later, without any warning symptom, the temperature rose to 109.8° F.; the pulse became of low tension and its rate increased to over 160. Later, convulsions occurred three times, and death ensued twelve hours after operation.

Post mortem most of the organs showed evidence of haemorrhages and congestion. The pancreas was largely replaced by a haemorrhagic necrotic mass, but there was no surrounding fat necrosis. The suprarenal bodies were full of blood. The pons and medulla on section showed pin-head petechial haemorrhages. Other organs showing petechiae and congestion were the kidneys, the thymus, and the lungs. The liver, though enlarged, did not share in the above changes. I am indebted to Mr. Norman Lake, under whom the infant was admitted, for permission to report this case.

Charles J. Lewis, M.B.

A new centre for the medical examination for civil aviators is to be opened at Bordeaux under the direction of Dr. Cruchet, professor in the Faculty of Medicine in that city. Hitherto the only such centre for medical examination has been at Le Bourget, near Paris. It is proposed to set up a third centre at Montpellier.

The commission of inquiry which President Harding sent to the Philippine Islands has reported that there are about 5,000 lepers in the islands, but that a lack of funds is preventing the treatment of more than 300 of these with chaulmoogra oil; the remaining lepers are stated to be practically without treatment.

Reports of Societies.

THE MODERN TREATMENT OF DIABETES.

A discussion on "the modern treatment of diabetes" took place at the meeting of the Medical Society of London on October 24th.

Sir Archibald Garrod, in introducing the subject, said that there was every reason to be proud of the achievements of Englishmen like Thomas Willis, Matthew Dobson, Rollo, and many others in the study of diabetes. During recent years there had been great advances in the knowledge of the subject, partly due to the ease with which the sugar in the blood might be estimated, so that the attention needed no longer to be confined to the urine. It had been possible to see the effect of the administration of a dose of glucose upon the blood sugar, and thus to isolate different diseases included under the name diabetes, and to show that the prognosis was not so uniformly gloomy as had been supposed. The important part played by aceto-acetic acid, which many thought was the poison producing diabetic coma, was becoming better understood; and altogether the position had been cleared for facing the problems of treatment. It was Rollo who initiated the dietetic treatment of diabetes. His book, published at the end of the eighteenth century, should be read by all who were interested in the subject. Rollo started on the assumption that the stomach was the beginning of the condition, but, as had often happened in medicine, on a wrong assumption he got on to a fairly right line of treatment. He put his patient on, for breakfast, 1½ pints of milk with an equal quantity of lime water; for lunch, puddings made exclusively of blood and suet, and for dinner, game or old meats which had been long kept, and, as the stomach would bear it, fats such as rancid pork. If the disease did not disappear he left off the milk and substituted beef-tea. Subsequently Rollo's protein-fat diet was improved upon to a certain extent, but students of forty years ago would still remember the huge meals which diabetics were given, of protein mainly, with a certain amount of fat. The modern treatment, as expounded by Allen in America and George Graham in this country, consisted of regulated fasting and graduated dieting. Both these methods of treatment rested on the fact that by starving the patient his damaged metabolic process was given a chance of recovery. Personally, the prolonged hunger days of Allen did not appeal to him so much as the shorter periods favoured in this country. There was no routine treatment of diabetes which could be carried out in a rigid manner. Every case had to be treated on its merits, and the hand must be always upon the tiller. The result of the modern treatment was enormously to increase the comfort of the patient and prolong his expectation of life. In hospital wards nowadays it was difficult to get a specimen of sugar in the urine for examination—a glowing tribute to the efficacy of the modern treatment. It was now understood that in the diet of the diabetic the proteins and fats might be deleterious as well as the carbohydrates, and that the patient was better off on a scanty diet, with rather a low calorie value all round. But while much could be done for the diabetic patient, he feared we were as far away as ever from the cure of diabetes.

Sir W. H. Willcox said that the first step in the treatment of diabetes should be the detection and removal of the cause. The true cause was damage to the pancreas by some toxic agent, and in the resulting degeneration no doubt bacterial toxins played a most important part. He had seen very severe glycosuria in a case of carbuncle in which, after successful treatment of the septic lesion, carbohydrate assimilation again became normal. In such a case it appeared that the toxins absorbed caused temporary arrest of the special pancreatic function. In mumps glycosuria was well known, and numerous cases of glycosuria in syphilis had been recorded. Some cases of severe diabetes under his care at St. Mary's had been bacteriologically investigated in the laboratory, and showed abnormal intestinal infections. In one case the stools had a large excess of pathogenic streptococci, and also an infection with the non-lactose-fermenting Morgan's bacillus. The importance of the removal of possible toxic causes acting on the pancreas had not been sufficiently realized; in every case it was necessary to

make a careful examination of the mouth, tonsils, and nasopharynx. The prevention of diabetes would be brought about by the early removal of toxic conditions of various kinds which had harmful effects on the pancreas, and the recognition of such effects could only be obtained by periodical examinations of the urine, a form of medical supervision which had not yet received the recognition it deserved in preventive medicine. As for dietetic treatment, the speaker said that during the last two and a half years all the cases under his care at St. Mary's had been treated on the lines laid down by Allen and Joslin; without exception it had been possible to remove the glycosuria, and a marked improvement had occurred in all but one patient, who in addition to diabetes had advanced phthisis. During a patient's stay in hospital his carbohydrate, protein, and fat tolerance was determined and alternative diets were drawn up for him which were well below the limits of tolerance. In severe cases with very low carbohydrate tolerance 30 c.cm. of alcohol, corresponding to 2 oz. of whisky, might be given, but, in view of its toxic effect on the liver, alcohol should not be given on fasting days, and was best avoided altogether in milder cases. The modern dietetic treatment of diabetes could not be said to be curative when permanent extensive damage to the essential cells of the pancreas had occurred; on the other hand, it might be safely foretold that a neglect to follow the modern dietetic treatment meant a progress from bad to worse. He had found rectal administration of glucose in severe diabetes to be of value in treatment, especially in cases where acidosis was threatened.

Dr. O. LEYTON agreed with the last speaker as to the extraordinary sensitivity of the metabolism of the diabetic to any toxin. On one occasion a practitioner attempted to immunize a patient against influenza while she was undergoing observation to find the optimum diet. She had reached only about a quarter of the amount she could tolerate without increase of sugar in the blood, but the injection led to a return of the sugar in the blood for several days. He remembered a small child who had been sugar-free for a year returning to the hospital a second time with quite a fair amount of sugar in the urine, yet the dieting had been strictly maintained. On inquiry he found that the child's sister had been suffering from chicken-pox, and his surmise proved correct that this child had been infected by the chicken-pox organism. It was out of the question to find the optimum diet of the diabetic while there was any focus from which poison was being disseminated. The treatment of diabetes mellitus failed in tuberculous patients; every now and then there was an exception in which it succeeded, but such exceptions were rare. Undoubtedly there was no cure for the true diabetic. The tolerance of some people could be greatly increased; he had seen cases in which the carbohydrate tolerance had been increased three- or four-fold what it was at the beginning, without any increase of sugar in the blood. But that was a slow process, and it was not possible to predict in which cases it would occur.

Dr. W. LANGDON BROWN thought it would be generally agreed that true diabetes was characterized by an exaggerated metabolism involving not only the carbohydrates but the fats and proteins, and even to some extent the inorganic salts. It was possible that rather too much had been attributed to the part played by the pancreas; the sympathetic nervous system was the mechanism through which the glycosuria was produced, though he would not go so far as to affirm that it was solely produced in this way. He emphasized the guidance to be obtained in the selection of appropriate treatment by the investigation of the blood-sugar curve in glycosuria, and he showed a large number of curves illustrating different conditions. Some of these related to intermittent or transitory glycosuria, the condition only appearing when the patient was overworked or subjected to some special strain. In these cases he did not insist on alimentary rest; he had to deal with the rapid influx of sugar into the blood, and he cut the sugar out and left the starch in. He also gave some of the starch cooked in fat so as to delay its entrance into the blood stream.

Dr. EDMUND SPRIGGS addressed himself to the question of the education of the patient. The real difficulty in the treatment of the diabetic was not in hospital—it was in the patient's own home, and the solution was to teach him so to control his diet that he would be enabled to "carry on." The preliminary examination carried out in the hospital with the blood-sugar and other tests must be done first to determine what class of case it was, but after this the success of the dieting depended upon the instruction which the patient received. The patient should be taught diabetic cookery, also something about foodstuffs and the arithmetic necessary for carrying out his diet day by day. He should be instructed in the collection and measurement of urine. In the speaker's own private hospital a course of instruction was given monthly, with cookery and laboratory classes, and two or three lectures by doctors to explain the reason for and the method of treatment. On visiting the hospitals in the United States where Allen and Joslin worked he was impressed by the classes of patients to whom such lectures were being given. The speaker also produced some samples of home-made diabetic bread. The breads of the Callard and Protene Companies were always found on analysis to be what they were represented to be, and, of course, were very widely used, but one disadvantage of the ordinary diabetic breads was their richness in fat and the variability of their fat content compared with their protein content. His own bread was a casein bread, made from separated milk according to the following recipe, devised by Dr. Spriggs and made by Mr. Leigh the chemist, and Miss Ledingham the diet sister, at Duff House.

Duff House Home-made Diabetic Bread.

One gallon of separated milk (cost about 6d.) is placed in an enamel dish and warmed, with stirring, to 100° F. A mixture of 45 c.cm. (=1½ fluid ounces) of glacial acetic acid and 450 c.cm. water (about ¾ pint) is prepared and poured into the milk at 100° F.), with constant stirring. The caseinogen separates as a white clot. The mixture is left to stand for about five minutes, and then poured through muslin placed on a fine sieve for about two minutes, meanwhile working the caseinogen with the hand so that most of the other milk products and acid may be washed away. The muslin containing the precipitate is taken from the sieve, pressed, placed in a bowl of cold water, and kneaded for about five minutes. The water is replaced by fresh six times, and the kneading repeated five minutes at each to ensure that all traces of milk sugar are removed. The washings were tested with Fehling's solution.

The muslin containing the white material, henceforth called "casein," is squeezed to remove as much liquid as possible, the muslin opened out, placed on a sieve, and left on the kitchen shelf for a few hours to dry. The casein is now rubbed through the sieve on to the muslin and put back on to the shelf overnight or until it is dry to the touch.

About 160 grams (5½ oz.) of the casein in this condition should be obtained from one gallon of separated milk.

To prepare the bread, beat up the whites of two eggs to a stiff froth, add 50 grams of the above casein (nearly 2 oz.), a pinch of salt, and 2 grams each of cream of tartar and sodium bicarbonate (that is, a teaspoonful of each powder, levelled off but not pressed down). Mix lightly together, form into cake or cakes, and bake in a moderate hot oven for 15 to 20 minutes.

The tin on which the bread is baked should be greased with liquid paraffin. This gives an unpleasant smell in the oven, but the bread has no taste of it.

The casein can be prepared at any time and in any quantity at the convenience of the housewife. It is best kept in a dry place in open vessels. The bread itself is made in a few minutes by whipping up the casein with the egg white, salt and baking powder. Sweet cakes can easily be made from it by putting in a little liquid saccharin and some desiccated cocoanut or other flavouring. When freshly baked the well-known and objectional cheesy taste of diabetic bread is less marked in this bread than in those on the market, but it is important that it should be made and eaten fresh. The taste develops if the bread is kept long. As the making and baking take only a very short time, it is easy by keeping a supply of casein powder to make bread fresh once a day or more than once a day.

The analysis of the bread as served gave:

Protein (nitrogen × 6.25)	52.5 %
Carbohydrate (starch and sugar)	*nil*
Fat (ether extract)	0.2 %

Twenty grams of it gives, therefore, approximately 10 grams of protein. In addition to its general use as a not unpleasant and inexpensive home-made bread substitute, rolls of about 20 grams are specially valuable when it is desired to increase the protein daily after fasting, without adding fat or carbohydrate.

With eggs at 3s. 9d. a dozen the cost works out at a little under 3d. for each 20 gram roll. The yolks of the eggs are, of course, included in the price, but could be used for some other purpose, such as for custard.

Dr. E. P. POULTON had tried to work out a plan for the instruction of hospital patients. His object was to keep the protein down to, roughly, 1 gram per kilo body weight. One ounce of meat or fish might be taken as equivalent to 6 grams of protein, so that if a man's weight was 60 kilos he would be allowed 10 oz. of meat, an egg being taken as equal to 1 oz. In the treatment of coma, which was comparatively rare, the important thing was

to get the aceto acetic acid excreted, and for this purpose it was very desirable that the patient should take fluid, which was often difficult with such a patient. He had given fluid to a patient with coma by means of a tube, and had found useful results in increase of urine.

Dr. George Graham laid stress on the importance of teaching the patient concerning the collection of urine, which should not be taken immediately on rising in the morning, but preferably after the principal meal of the day, or after a meal in which the patient had taken a fair amount of the carbohydrates allowed him. It was very important also to keep early and severe cases in bed; the practice at St. Bartholomew's was to keep them in bed as long as possible, certainly until it had been established how much they were able to take. The speaker touched on some differences between Allen's method and his own. The general principle was the same in both—namely, under-nutrition. Allen made the point that the patient should order his life according to the size of his pancreas; he (the speaker) would rather put it that the governing consideration should be the number and working order of the islands of Langerhans. After an initial fast-day and two Van Noorden egg and vegetable days, his own method was to start increasing the proteins, leaving the carbohydrates to come afterwards; Allen, on the other hand, increased the carbohydrates first, not the proteins. The amount of protein which the speaker gave was always much smaller than that which Allen recommended his patients to take.

Dr. P. J. Cammidge said that he had kept in touch with 143 cases treated by the modern or fasting treatment of diabetes, and of these fifty-two had died. In spite of the remarkable immediate effects of the fasting treatment in many instances, there were cases in which it gave rise to disquieting and even dangerous symptoms from an early stage. He had met with nervous disturbances, ataxia, and tetanic convulsions, which necessitated the abandonment of the treatment. The treatment was not a panacea. He must regard it as an empirical treatment until some new method of testing the correctness of the hypothesis on which it rested might be discovered. He believed, however, that there was such a method of testing available—a method which depended upon the determinations of the difference between the percentage of sugar and the percentage of total carbohydrate in a series of specimens of blood taken at hourly intervals before and after a test breakfast. This method of difference-value (which he elaborated) had furnished him with a means of ascertaining whether diabetes was or was not invariably due to disease of the pancreas. His conclusion from some 150 cases examined was the high probability that clinical diabetes was not a single simple pathological entity, but a symptom-complex which might develop along at least three lines, of which disturbance of the pancreas was one. This might account for the varying symptoms and widely different progress of the disease in different individuals, and why no one method of treatment had yet been found to give uniformly satisfactory results. The fasting treatment had most nearly attained this end because it was not merely a means of securing physiological rest for the pancreas, but also tended to relieve the liver from overstrain and gave other organs an opportunity for rest and repair.

Dr. F. J. Poynton described six cases of children under 8 years of age who had been under his care during the last two years. The treatment was carried out on the lines of which they had heard so much that evening. Most of the children had about 3 or 5 per cent. of sugar, and he was invariably successful in getting the sugar out; and with great care and caution he gradually increased the diet. The mothers of these children were most careful persons, and the children themselves remarkably brave. The little patients went out sugar-free, and some of them had kept sugar-free for months, returning, not on account of dietary lapses, but perhaps because of some change in the weather. Each time they returned it was more difficult to get the sugar out. In spite of infinite care, four of these children were dead, one might die at any time, and the other was still getting sugar. He confessed that he was looking much further than this elaborate dieting for a real cure of diabetes.

Sir Archibald Garrod said that the discussion, although full of interest, had not been of a kind which involved any point of contention, or called for any reply from him as opener.

BIRTH CONTROL.

The first meeting of the Medical Women's Federation was held on Tuesday, October 18th, at the Elizabeth Garrett Anderson Hospital. Dr. Louisa Martindale was unanimously elected president for the coming year.

Dr. Martindale gave an address in which she discussed the question of birth control. She pointed out that the birth control movement in England dated from the year 1877, when the Bradlaugh-Besant trial took place. In Germany the movement started later, but, once started, the birth rate fell as much in twelve years as it had done in seventy years in France. The fall in birth rate was, however, accompanied by a corresponding fall in infant death rate, so that up till now the natural increase in population had been little affected. Statistics showed, further, that both birth rate and infant mortality rate were lower in the more thoughtful and educated classes, and that it was among these classes that methods of birth control were chiefly used. Methods of controlling birth might be classified as:

1. *Natural.*—Either celibacy or voluntary abstinence, which might be total or during the most fertile part of the woman's monthly cycle.
2. *Methods used by Husband.*—(*a*) Withdrawal, or coitus interruptus; (*b*) the use of sheath or French letter; (*c*) a dose of *x* rays.
3. *Methods used by the Wife.*—(*a*) Quinine pessaries; (*b*) douching; (*c*) introduction of rubber cap.

Of these methods it was agreed that coitus interruptus was bad for the nervous system of both husband and wife. The French letter was the most efficacious; douching and the Dutch cap were not entirely satisfactory. Dr. Martindale then gave a summary of the views of the English and Roman Catholic Churches and of the Jews on the ethics of the matter, and then summed up the reasons for and against birth control. Relative poverty, illness during pregnancy or confinement, the possibility of enforced separation should a baby arrive (as amongst Anglo-Indians), disease such as tuberculosis, inherited insanity, etc., were the chief reasons given in favour of birth control, while the risk of encouraging sexual excess and the possibility of eventual sterility were the main reasons against the practice. The aim of the movement was undoubtedly to better the conditions of women's lives. Dr. Martindale pointed out that, in her opinion, there were other worthier ways of attaining this end—as, for instance, by an efficient scheme of employment, and by improved housing, as well as by educative methods which would help to decrease rather than increase sex excitation.

An animated discussion took place, and it was decided to consider the question further at a subsequent meeting.

Reviews.

EARLY CHEMISTRY IN OXFORD.

In the active interest taken in the history of science at Oxford, as shown in the *Studies in the History and Method of Science*, edited by Dr. Charles Singer, and recently reviewed in our columns (p. 323, August 27th, 1921), the influence of the late Sir William Osler played a most stimulating part. Further evidence of the late Regius Professor's contagious enthusiasm may be traced in the projected scheme of *Early Science in Oxford*, of which the first part is that on *Chemistry*,[1] by Mr. R. T. Gunther, Fellow and Tutor of Magdalen College, who, it may be remembered, organized the collection of scientific instruments of historical interest from Oxford colleges exhibited when, on May 16th, 1919, Sir William Osler delivered his presidential address to the Classical Association on "the Old Humanities and the New Science," an address published in our columns shortly afterwards.

The present instalment of the new venture will be followed by Part II on *Mathematics*, but Part III on *Astronomy* and later parts must, we are warned, wait until the subscription list is sufficiently long. Had it not been for the war this story of early chemistry in Oxford would have

[1] *Early Science in Oxford: Part I—Chemistry.* By R. T. Gunther. Printed for sale at the Oxford Science Laboratories by Hazell, Watson and Viney, Ltd., London and Aylesbury. 1920. (Demy 8vo, pp. 96; 19 illustrations. 10s. 6d. net.)

been printed in 1914, when the seven hundredth anniversary of Roger Bacon's birth occurred. It is therefore appropriate that the initial chapter should touch on the life of him who first insisted that the only true method of scientific advance is by experiment, and that the study of chemistry is essential in medical education. This is followed by an account of the apothecaries and spiceria, or the place where spices, seeds, and roots were sold, in mediaeval Oxford. The story of Robert Boyle's chemical researches in Oxford in the middle of the seventeenth century is fully told and is illustrated by a successful reproduction of his charming features. He brought "the noted chimist and Rosicrucian Peter Sthael of Strasburgh in Royal Prussia" as the first regular teacher of practical chemistry to Oxford, where, among other distinguished pupils, he had John Locke of Christ Church, "a man of turbulent spirit, clamorous, and never contented." The frontispiece is a portrait of Johannes Mayou (1640–1679), physiologist and perhaps the greatest chemist ever produced by Oxford, who grasped the essential facts about the formation of acids and oxides more than a century before Lavoisier.

The first university chemical laboratory was founded in 1683 by Elias Ashmole, astrologer, alchemist, virtuoso and curioso, who had amassed a raree-show of a miscellaneous character, and is now almost exclusively known in connexion with the Ashmolean museum of archaeology. The records of chemical studies in Oxford during the eighteenth century are disappointing, and show that the spirit of inquiry had become largely dormant, though Dr. Martin Wall, who must be distinguished from Dr. John Wall, the founder of the Worcester china factory, was an attractive figure as a lecturer. In 1803 Dr. G. Aldrich founded a professorship of chemistry, held by John Kidd until 1822, when he became Regius Professor of Medicine, and then until 1854 by Dr. C. Daubeny, whose modern outlook makes it doubtful if he should be considered in relation to *early* science in Oxford.

THERAPEUTICS.

The Principles of Therapeutics, by Professor OLIVER T. OSBORNE,[2] of Yale University, is intended for senior students and practitioners, and though based on the United States pharmacopoeia, will give British readers much information in an easily assimilable form. Of the constituent fifteen parts, the last, on medical ethics, describing the principles of medical ethics of the American Medical Association and giving suggestions to young practitioners on this subject, is a useful though rather novel section in a work on therapeutics. In the remarks on the art of prescribing it is pointed out that the old hobby of letting Nature cure the patient has been ridden too long, for Nature is a good mother not only to the patient, but also to invading micro-organisms, and consequently neglect will not bring about a cure. Medical men, Professor Osborne thinks, could play a part in breaking down the deeply embedded belief in the mystery of the treatment of disease, by writing prescriptions in simple English instead of in Latin which may not always be correct.

The author gives a therapeutic classification of drugs into two great divisions—for local use and for systemic action respectively—each with sub-divisions; in each subdivision the subject is fully treated, and the action and use of the most important drugs described; thus there is a subdivision for drugs and preparations esteemed specific, such as antitetanic, antidiphtherial, and antimeningococcic serums, arsphenamine (salvarsan) and mercury in syphilis, calcium in tetany, oranges and lemons in scurvy, quinine in malaria, serums in haemorrhage, and thyroid extract in myxoedema and cretinism; this is followed by a section on drugs used as specifics—namely, colchicum in acute gout, and salicylic acid in acute rheumatism. In the section on organotherapy the preparations of the endocrine glands are divided into (*a*) those of recognized value—namely, thyroid, parathyroid, pituitary, adrenal, and corpus luteum; (*b*) those with less therapeutic value, and hence not generally accepted—namely, ovary, placenta, mamma, testis, thymus, and pineal; and (*c*) glandular tissues with important functions, but extracts of which have not been proved to have therapeutic value other than that of food or aids to digestion—pancreas, spleen, secretin, liver, kidneys, parotid, prostate, lymphatic glands, brain. After a full discussion of the therapeutics of corpus luteum and ovary, and reference to their relationship to the thyroid, the conclusion is reached that ovarian insufficiency is probably very common in older girls and young women, but that whether this deficiency is most satisfactorily met by stimulating the thyroid by iodine, by giving ovarian extract or small doses of corpus luteum or ovarian residue, must be decided by clinicians and by clinical observations. After a section on practical therapeutic measures, such as inhalation, enemas, aspiration of the chest and transfusion of blood, there is a clear summary of vaccine and serum therapy. The subject of food is next considered, and an account of vitamins follows. General physical measures, such as Bier's hyperaemia, heliotherapy, electricity, radium, massage, and hydrotherapy, are reviewed; and in the description of chronic drug poisoning the influence of prohibition in developing some other excessive habits is discussed; it is interesting to learn that before the war the consumption of tobacco per head of the American population was 5.57 lb., or more than double that in this country. The work, as a whole, conveys accurate information on many subjects in clear language.

[2] *The Principles of Therapeutics.* By Oliver T. Osborne, M.A., M.D. Philadelphia and London; W. B. Saunders Co. 1921. (Roy. 8vo, pp. 881. 35s. net.)

COLLOIDAL STATE OF LIVING MATTER.

M. A. LUMIÈRE, in his small book on colloids in living matter,[3] although he claims to enunciate an entirely new theory, has reached a general conclusion the possibility of which probably no one in this country would deny—namely, that the colloid state is a condition of life and that flocculation determines disease and death. It is now well recognized that the colloidal state is one of the absolutely essential conditions of cellular activity, but until more information is available as to the methods by which the colloidal state is attained, maintained, and controlled, the fact must remain of little practical value from the practitioner's point of view.

In this little book, which is very interesting and often very suggestive, M. Lumière first briefly discusses the nature of the colloidal state and then goes on to show its bearing in vital processes, such as growth, nutrition, etc. He emphasizes the point that the colloidal state differs in different cells. The next subject with which he deals is anaphylaxis, and to it he devotes the major portion of his book; he gives a very interesting account of the phenomenon and asserts that anaphylactic shock is due simply to the formation of a precipitate in the circulation. He concludes that there is some close connexion between anaphylaxis and chronic disease. He suggests that as age advances the intestinal mucosa is no longer so healthy, and that, as a result, small amounts of protein can be absorbed unchanged, which develops a condition akin to anaphylactic flocculation; he, however, omits any reference to the work of Waymouth Reid, Voit, and others, who have definitely shown that even under normal conditions unchanged protein may be absorbed from the intestine. He holds, too, that acute infections are explicable along the same chain of reasoning: that in this case the pathogenic organisms bring about a flocculation without previous treatment. He contends that the only correct line of attack on the problem from the curative aspect is to determine the adequate methods of desensitization. Incidentally he devotes some space to showing that plants, like animals, are subject to anaphylactic shock. The book is provided with a particularly full and useful bibliography, 622 references to anaphylaxis, 67 to Brownian movement, and no fewer than 1,007 to the colloidal state. It is illustrated with over twenty plates, seven of which are well executed in colour.

[3] *Rôle des colloides chez les êtres vivants.* Par Auguste Lumière. Paris: Masson et Cie. 1921. (Imp. 16mo, pp. 319; 14 plates, 19 figures. Fr. 16.)

EUCALYPTUS TREES AND OILS.

THE *magnum opus* of Messrs. R. T. BAKER and H. G. SMITH on *The Eucalypts and their Essential Oils*,[4] now in its second edition, contains a vast amount of information about the botany and pharmacological products of the genus *Eucalyptus* and the numerous species it contains.

[4] *Research on the Eucalypts, especially in Regard to the Essential Oils.* By R. T. Baker and H. G. Smith, F.C.S. Second edition. Published by authority of the Government of New South Wales. Sydney; W. Applegate Gullick. 1920. (Double roy. 8vo, pp. 468; illustrated.)

Mr. Baker is the curator and economic botanist, and Mr. Smith assistant curator and economic chemist, at the Technological Museum, Sydney, and the book is of the nature of a report to the Department of Education of New South Wales.' It forms No. 24 of the Technical Education Series.

The book is divided into three parts. The first of these is short, and describes the systematic classification, nomenclature, and distribution in Australia of the 178 species of the genus *Eucalyptus* the two authors have studied. They are inclined to deny the reputed great variability of individual *Eucalyptus* species; botanically speaking, this view may be justifiable, but it is found that a single species will always give an oil of fairly uniform chemical composition. Part II, forming the bulk of the volume, contains an account of the botany and chemistry of each of the 178 individual species of eucalypts investigated.

Part III is given to technological and chemical considerations. It appears that about forty distinct chemical constituents have been isolated from eucalyptus oils; more than half of these have been first isolated by the authors themselves, the actual oils being obtained by the distillation of the leaves and terminal branchlets of the trees. There is little to show which of these various constituents is really the most valuable part of eucalyptus oil from the medicinal point of view. The United States *Pharmacopoeia* demands that eucalyptus oil shall contain at least 70 per cent. of cineol, $C_{10}H_{18}O$, whereas the *British Pharmacopoeia's* standard is described as more reasonable, seeing that it only asks for 55 per cent. of cineol. It is clear that there is room for investigation here. Commercially speaking, eucalyptus oils are also used for mineral separation; again, several of the pleasant-scented constituents of eucalyptus oil are used extensively in perfumery and for scenting soaps.

The book is well arranged and admirably illustrated both by plates, many of them coloured, and by drawings in the text. The authors in their preface state that they are both approaching the age limit for retirement, and take the opportunity of placing on record their appreciation of the far-sighted policy of the New South Wales Department of Education, which has encouraged them in their research work and enabled them to take a share in bringing to light for the "benefit of pure and applied science some of the hidden mysteries of Australia's unique and wonderful flora." We congratulate the authors on the success they have attained in the present volume.

MEDICAL TREATMENT OF THROAT AND EAR DISEASES.

Dr. de Parrel has presented a comprehensive study of forms of medical treatment applicable to diseases of the ear and throat in a book which he calls a *Précis* of medical therapeutics in oto-rhino-laryngology.[5] The word *précis* seems scarcely applicable to a volume of this size, and, indeed, we feel that the information it contains might have been contained in a book of less bulk, since any discussion of surgical treatment has been excluded. If, however, the author has not risked clarity to obtain condensation, he has succeeded in giving a singularly complete account of the subject. Not only are matters strictly related to this special branch of medicine included, but cognate subjects which are not usually discussed in the ordinary textbooks are here assembled and fully described; this perhaps constitutes the chief value of the book as a work of reference. For example, a full account may be found of pharmacology, of the teaching of lip-reading, voice-production, and the treatment of neuroses, and of electro-therapeutics, besides other topics on the borderland of otology and laryngology.

Towards the end of the book eighty-five pages are devoted to the description of the various health resorts in which France is so rich. The author remarks that many medical men, especially the juniors, are insufficiently informed on this subject, and are apt to expose their lack of knowledge on being unexpectedly questioned by a patient. The characters of each of the mineral stations are here fully described and the type of maladies for which they are best suited are noted. In this section Dr. de Parrel has had the assistance of several colleagues.

[5] *Précis de Thérapeutique Médicale Oto-Rhino-Laryngologique.* Par G. de Parrel. Préface du Dr. Pierre Sebileau. Paris: A. Maloine et Fils. 1921. (Demy 8vo, pp. 681. Fr. 28.)

One of the most interesting sections of the book is that which deals with vaccine-therapy. It is written by Dr. Cohendy of the Pasteur Institute, who is an outspoken advocate of sensitized vaccines, having found them successful when the ordinary vaccines have failed. Here again the subject is dealt with fully; the mode of preparation and exact methods of administration are described in detail. In addition there is a systematic account of the treatment of diseases of the ear, accessory sinuses, pharynx, and larynx. Only the indications for surgical treatment are described, but whilst the author has taken medical treatment as his theme, he has avoided any misleading tendency to insist upon it to the exclusion of surgery where the latter is indicated. The account given under this category is helpful, reliable, and full of suggestions.

Looking at the work as a whole, the author appears to have included some methods of treatment of doubtful utility, possibly in the effort to do justice to the medical aspect of his subject. It would, perhaps, have been wiser if in some instances he had been more restrained, but the work has a special value at the present time in view of the tendency of surgery to overshadow other methods of treatment, and it should be particularly helpful to the practitioner as a book of reference.

THE CARE OF INFANTS AND CHILDREN.

We have received still another edition of Dr. Holt's little book on *The Care and Feeding of Children*,[6] which now requires little introduction and brief commendation. In the form of a catechism, it conveys to nurses and young mothers useful facts concerning the healthy growth and upbringing of infants. The questions and answers are drawn up in the simplest and clearest language, and deal with the really important questions of infant hygiene and physiology—the care of the skin, the clothing, the bath, the nursery, and, above all, the feeding of infants. If these things were understood and carried out in all our nurseries and homes, there would surely be an immense gain in lives saved and good health preserved; and this little manual has already proved, both in America and Great Britain, a valuable weapon in the campaign of education. It is written by a master of the subject, and yet it is written so plainly that anyone who can read will be able to understand. The book is divided into three sections, the first dealing with infant hygiene, the second giving careful instruction in all the details of artificial feeding, and concluding with a useful list of food formulas. The third section is chiefly concerned with the symptoms and management of miscellaneous minor ailments in infants and young children.

REPRESSED EMOTIONS.

If the claims which Dr. Isador H. Coriat makes on behalf of psycho-analysis, in his volume on *Repressed Emotions*,[7] were even partially substantiated it would indeed be a discovery of great benefit to mankind. In his opinion apparently there are no limits to its possibilities, and the whole atmosphere of this volume is one of adulation which tends to become wearisome. The book is filled with sentences beginning: "Psycho-analysis has shown . . .," "Psycho-analysis has demonstrated . . .," "Freud has demonstrated . . .," etc.; and, unfortunately, many of the theories which Dr. Coriat regards as definitely proved by psycho-analysis relate to some of the most obscure and difficult problems which psychiatrists have endeavoured to solve. Thus the writer states, on page 177, that the character traits of the individual are not inherited, but are determined by repressions in childhood. Surely this is a most misleading statement. It would be most satisfactory if it were true, but unfortunately the influence of inherent reacting tendencies cannot be dismissed in this dogmatic way. In discussing the possibility of psycho-analytic therapy in the psychoses, Dr. Coriat states that the view that dementia praecox is a psychogenetic and not an organic disorder is now gaining credence among *all psychiatrists*. It is difficult to understand how a writer with Dr. Coriat's wide knowledge of the literature

[6] *The Care and Feeding of Children.* By L. Emmett Holt, M.D., LL.D., Professor of Diseases of Children, Columbia University. Ninth edition. London: D. Appleton and Company. 1921. (Sup. roy. 16mo, pp. 149. 4s. net.)

[7] *Repressed Emotions.* By Isador H. Coriat, M.D. London: George Allen and Unwin, Ltd. 1921. (Cr. 8vo, pp. 215. 7s. 6d. net.)

of psychiatry can commit himself to such an incorrect statement. If the author had confined himself to his own views on a subject such as this they would, no doubt, have proved of interest and value, but it would only be fair that he should state that many of the most eminent psychiatrists have expressed entirely contrary views.

Dr. Coriat has a number of interesting things to say in his book, but the note of exuberant enthusiasm is more suited to the advocate of a new religion than to a scientific writer who is endeavouring to understand and explain to his readers those problems which have perplexed mankind from time immemorial. Most of his readers will feel that Dr. Coriat allows his enthusiasm to run away with him when he writes, "Psycho-analysis is beginning to found a new ethics as well as a new psychology, a new neurology, and a new school of literary criticism." Can it really be that our ethical teachers, our psychologists, neurologists, and literary critics were so unilluminated before the advent of Freud as these phrases would seem to imply?

NOTES ON BOOKS.

Dr. Dutton's little pamphlet on *Obesity: its Treatment*[8] gives a short but practical account of the dietetic treatment of the condition. The book is one for medical practitioners, and may be recommended to their attention.

The Pharmacopoeia of the Manchester Children's Hospital[9] contains a list of the stock medicines employed in the hospital, and in addition a useful posological table. The book is of convenient size and neatly turned out.

Italian Technical Words and Phrases,[10] an English-Italian and Italian-English dictionary, by E. F. Paventa, is the third of E. Marlborough and Co.'s foreign technical manuals, the other two dealing in the same way with French and German. It contains technical terms and phrases used in business, the professions, arts and sciences, and an appendix of tables giving the equivalents of weights, measures, and money. Medical terminology receives attention in due proportion; thus there are six pages giving the commoner medical synonyms in each division of the work, and there is a special medical section of weights and measures. This little volume is specially adapted for the traveller's convenience by going easily into the pocket, and, further, is provided with a few spare pages for the additional memoranda that so often seem desirable.

[8] *Obesity: its Treatment.* By T. Dutton, M.D. Second edition, entirely rewritten. London: H. Kimpton. 1921. (Cr. 8vo, pp. 48, 2s. 6d. net.)

[9] *The Pharmacopoeia of the Manchester Children's Hospital, 1920.* Manchester: Chas. Sever. 1920. (Roy. 32mo, pp. 58.)

[10] *Italian Technical Words and Phrases: An English-Italian and Italian-English Dictionary.* By E. F. Paventa. London: E. Marlborough and Co. 1921. (16mo, pp. 308. 6s. net.)

THE MEDICAL DEFENCE UNION.

The annual meeting of the Medical Defence Union, Limited, was held at the rooms of the Medical Society of London on October 20th. The President, Sir Charles Ballance, who was in the chair, in moving the adoption of the report of the council for the year 1920–21, congratulated the members on its satisfactory nature. It was a record of steady progress and of useful and successful work on behalf of the members and the profession generally. He had been very much impressed by the great variety of the subjects coming under the purview of the council, as well as by the efficient and business-like manner in which the various matters were dealt with. The meetings of the council were well attended and the administrative work of the office was satisfactorily performed, invaluable service having been rendered during the year by the general secretary and by the solicitor. There had been a large increase in membership, a substantial sum of money had been invested, and no call had been made — nor so far as he could judge, was ever likely to be made—upon the guarantee fund, which now amounted to over £12,500. Until he became president of the union he had scarcely realized how essential it was for everyone engaged in medical practice to belong to such an organization; but after his experience on the council during the last twelve months he was at a loss to understand how any medical practitioner could fail to take advantage of the protection and security afforded by membership of the union. The report of the council and the financial statement for the year 1920 were adopted unanimously.

In the annual report it is stated that the number of new members, 576, elected during the year exceeded the removals by death and resignation, with the result that the total membership is now greater than it has ever been previously. The statement on assets and liabilities of the Union on December 31st, 1920, shows an excess of £9,574 of assets over liabilities, or, after taking into account the sum guaranteed by members, a surplus of £19,876. The council is satisfied that the new arrangement by which the premium for the indemnity insurance is included in the increased annual subscription now payable by every member, is very generally appreciated. The single payment of £1 per annum now provides what is practically a complete cover against all pecuniary risk.

The solicitors report that during 1920 the number of cases of which they had the actual conduct amounted to 90, which is fewer than the number so conducted by them in the previous years. The explanation given of this decrease was that many more cases were dealt with in conjunction with the general secretary, who conveyed the views and advice of the solicitors to the members concerned, instead of their dealing with such members direct as had been the practice in the past. Of the 90 cases actually dealt with by the solicitors, 25 involved allegations of negligence or malapraxis, from which it would appear that actions for malapraxis are on the increase; this term, however, includes not only cases instituted against the practitioner by a patient claiming damages for alleged negligence, but also cases in which members have had recourse to legal proceedings for the recovery of fees, and a defence of negligence has then been set up. During the year no action which went to court has been lost, though in two cases where allegations of malapraxis had been made, the members concerned, as an act of grace, having regard to the circumstances of the patient, agreed to reduce their fees.

Attention was called to a letter from the secretary of the Union, which was published in th British Medical Journal, in which he invited members who received from the local water company a demand for extra water rate for water used in dispensing to repudiate liability for such extra water rate, and to communicate the facts at once to the Medical Defence Union. The solicitors' chief reasons for forming the opinion that the extra water rate demanded was illegal were that the use of water by a medical man, either for the dilution of drugs or for the washing of bottles, was a domestic use within the meaning of the Water Company's Act, as distinct from the use of water for professional or business purposes, as the practitioner in question was merely doing collectively what the patients were entitled to do individually; and that the water in question, in so far as its mixture with drugs for medicinal purposes was concerned, was for the domestic purpose of drinking.

A scheme was developed last year by the Union by which every member obtains indemnity, in all cases undertaken in his behalf by the Medical Defence Union, against costs and damages of the other side to the extent of £2,500. This scheme, which came into force on January 1st, 1921, involves an additional optional payment of a premium of 7s. 6d. to the insurance company with whom it was negotiated. Cases arising out of the National Insurance Acts had been fewer than in previous years, owing, in the solicitors' opinion, to the fact that the Insurance Acts and the numerous rules made under them are now more fully understood and are dealt with in a more liberal manner than in the past. Both the Acts and the rules, they state, are very lengthy and complicated, and the wording of such a character that the meaning of many clauses was difficult to understand; many of these difficulties have now been cleared up by decisions of the courts of law and others by the decisions of the Insurance Commissioners. It is believed that there has been a better disposition upon the part of the Insurance Committees towards medical practitioners, and that it is recognized that it is the desire of every member of the profession to do his best for his patients.

The Union has incurred heavy expenditure in the prosecution of unqualified practitioners, but it believes that this practice, although costly, is most desirable in the interests of the profession in general and is the only way to prevent the penal clauses of the Medical Acts becoming a dead letter. The General Medical Council has no power to institute proceedings in the case of practice by unregistered persons, and as in the last twenty years no fewer than 282 unqualified practitioners have been prosecuted or otherwise dealt with by the Union, it is evident that the number of these unscrupulous persons would have been much larger but for the activities of the Union.

British Medical Journal.

SATURDAY, OCTOBER 29TH, 1921.

INSURANCE MEDICAL REMUNERATION.

The Minister of Health has maintained his uncompromising attitude and has reiterated his intention to reduce the capitation fee for insurance practitioners from 11s. a year to 9s. 6d. The Annual Conference of Local Medical and Panel Committees has acquiesced in this reduction on patriotic grounds. The Minister has agreed that this rate shall continue in force for a period of two years, and has announced that the mileage payment shall remain as at present. Such, in brief, is the outcome of the deliberations of the Panel Conference and of the second deputation of the Insurance Acts Committee to Sir Alfred Mond, both of which are reported fully in this week's Supplement. It will be remembered that the capitation fee of 11s. per annum was fixed by an independent board of arbitrators on March 5th, 1920, and has been in operation since the beginning of last year. The special mileage fund of £300,000 for England and Wales was granted early in 1920 by Dr. Addison, in order to compensate for the greater work and outlay of the rural practitioners. The additional uniform capitation fee of 2s. a year for those doctors who supply drugs and appliances remains also unchanged.

So that there may be no misapprehension as to who has spoken on behalf of the insurance practitioners of the country in this matter, it may be well to state shortly the position and duties of the Panel Conference and the Insurance Acts Committee. The Conference of Local Medical and Panel Committees, arranged by the British Medical Association, constitutes the central representative body of the insurance practitioners of Great Britain; it meets annually, or more often, to determine the policy of insurance practitioners in insurance matters. The Insurance Acts Committee of the British Medical Association is the authorized executive of the Panel Conference. It is the executive committee of a representative conference and its course of action is laid down by the decisions of the Conference. Within its sphere of responsibility the Committee's duty is to deal with all matters arising under the Insurance Acts, to watch the interests of the medical profession in relation to these Acts, and to report and make recommendations to the Council of the British Medical Association and to the Conference. Its constitution has been evolved to meet the special needs of the circumstances in which it carries out its functions. Thus, while the officers of the Association are members *ex officio* of this as of all other committees of the Association, and there are six members elected by the Representative Body of the Association, together with certain representatives of other medical bodies and interests, the Insurance Acts Committee contains a majority of members (who need not be members of the Association) selected by the Local Medical and Panel Committees of the country, and chosen, as far as possible, on a territorial basis. The Committee now numbers thirty-two, of whom eighteen members are direct representatives of Local Medical and Panel Committees, and one is *ex officio* a member because of his position as chairman of the Conference.

The status of the Panel Conference as the accredited chamber of deputies of medical practitioners working under the Insurance Acts has never, we believe, been seriously questioned. In times past there have been attempts by other bodies to convene subsidiary meetings of the same kind on their own account, but their failure has only emphasized the right of the official Conference to speak in the name of the insurance practitioners of Great Britain, and to shape policy on their behalf. On the other hand, year by year determined efforts have been made by a small minority to discredit the Insurance Acts Committee and to displace it as the recognized executive of the Conference and its mouthpiece for central negotiation. The failure of these attempts is a matter of history. An overwhelming majority of representatives of panel practitioners has always returned a vote of confidence in the Insurance Acts Committee, and has deprecated the setting up of new bodies as tending to weaken the forces of the profession. Some of the old arguments were heard again during last week's Conference, and the usual vote was taken with the usual result, but the old spirit of faction was less patent. We prefer to regard this as a sign of growing unity rather than as an admission of defeat by the agents of disruption.

The first move in the proceedings that led up to the present situation was made on September 27th last, when the Secretary of the Ministry of Health informed the Insurance Acts Committee that the Minister had come to the conclusion that a reduction ought to be made in the capitation fee paid to insurance practitioners after December 31st next. The Medical Secretary replied asking the reasons which had led the Minister to propose to set aside the decision of the arbitrators. Sir Alfred Mond then invited a deputation of the Insurance Acts Committee to meet him, and on October 11th announced to them his intention, acting on the Government's decision, to reduce the fee to 9s. 6d. He expressed his regret at reopening the matter so soon after the arbitrators' award, but in the present state of the finances of the country he considered the proposed fee reasonable and generous, and one which he could confidently ask the profession to accept. The Chairman of the Committee told the Minister that while the profession might, for patriotic reasons, be prepared to consider a reduction, it must feel assured that there was no risk of any deterioration in the efficiency of the service. Sir Alfred Mond, however, declined to reconsider the amount named, and subsequently, in reply to a further communication from the Committee asking him to modify his offer to one of 10s., he said he had fixed upon the figure of 9s. 6d. as one that was fair and reasonable in all the circumstances. He added the hope that the Conference, taking a wide view of their responsibility not only to their own profession but to the community at large, would appreciate the reasonableness of his proposal. These matters were duly reported by the Committee to the Conference on October 20th. After full discussion, in the course of which, as will be seen from our report, all shades of opinion were heard, the Conference reaffirmed its view that a proper capitation fee was 13s. 6d., and that patriotic grounds and reasons of public economy could alone justify any request that the profession should take less than the 11s. awarded by independent arbitrators in March, 1920. Recognizing the force of the appeal to citizenship made by the Minister of Health "to make some sacrifice for the common good in a great financial crisis," the Conference declared its willingness to accept 10s. on these grounds, and these grounds alone. It instructed the Insurance Acts Committee

with three other members of the Conference to see the Minister and ask him to revise his offer to one of 10s. in order to secure the co-operation of the profession. The deputation could not persuade Sir Alfred Mond to improve his offer, but obtained from him a guarantee that the fee should remain fixed for two years, and a promise to discuss various matters of detail with the Insurance Acts Committee if his offer were accepted. The Conference, having heard the report of the deputation, agreed by a large majority to accept the Minister's offer.

The position is not an agreeable one, but we believe that the profession at large will be of opinion that the Panel Conference and its Committee have acted wisely in circumstances of great difficulty. Whatever may be thought of his method or his manner, it is clear that from first to last the Minister made his appeal on grounds of patriotism. The Conference appreciated the force of the appeal to citizenship, although as Dr. J. A. Macdonald remarked, it was another question whether this was a just patriotic appeal or not; one of the difficulties was to estimate a fair reduction on patriotic grounds. The principle being admitted—namely, that the appeal should be responded to—those negotiating on behalf of insurance practitioners were faced with this difficulty, that the amount of the sacrifice became a matter of detail because no guiding principle stood out. The main argument against so large a reduction as 1s. 6d. was that this might endanger the satisfactory nature of the service, if, indeed, it did not overstep the financial line that separates efficiency from inefficiency. Even this argument, valid as we know it to be, contains a certain ambiguity in that the term "satisfactory service" may be taken to imply either that the service is satisfactory to the patient or that the doctors who render it are satisfied. The representatives of insurance practitioners have agreed to accept a capitation fee of 9s. 6d. This means that the practitioners undertake to give a service satisfactory to their patients. The public must not, however, suppose that the medical profession in accepting it is satisfied with this figure as a fair and proper rate of payment for the work and the responsibility. It is not.

OUR DAILY BREAD.

THE Ministry of Health has added to the series of reports on public health and medical subjects one by Dr. J. M. Hamill on diet in relation to normal nutrition.[1] The report is valuable, and its publication at this time opportune. We say this advisedly, although one at least of our lay contemporaries has dismissed it as containing nothing of sufficient importance to warrant its publication at the cost of the taxpayer. We could wish that the daily newspapers had given attention to the report, for, though the information it contains may not be agreeable, it must, sooner or later, find its way into the public mind, and by reading it now the taxpayer might save much expenditure and unhappiness later on. It is much easier to write sprightly paragraphs upon vitamins than to grapple with such prosaic details as the energy value of a diet or the number of calories to be had for a penny.

To the plain man the question of providing day by day his daily bread, although not lending itself to epigrammatic description, is sufficiently important. At the present moment, according to the Prime Minister, the economic position of the working classes is more serious than it has been for a century; hundreds of thousands of people in this country are now face to face, not with famine in the Russian sense, but with the certainty that only the most intelligent utilization of dwindling resources can save them from under-nutrition. Yet there is hardly any subject respecting which the people are less well informed than the simple physiology of dietetics. A great many people believe that the physiological value of a foodstuff varies as its market price, others are still impressed by advertisements of the "ox in a teacup" class. The number of persons whose health has been injured by confidence in the powers of medicated wines to "build up" the "constitution" is probably not less than the number of those who have fallen victims to the Spanish Prisoner. Against the latter the police are some protection; our only defence against traders upon popular ignorance of physiology is popular education.

In his report Dr. Hamill has set out the basal facts upon which all physiologists are agreed. He defines the limits of energy needs which have been set partly by direct experiment, partly by observation of diets actually used in different classes. As he says, "divergencies are noticeable in the amount of protein and also in the proportion of carbohydrates and fats, and, in the table in which Atwater's conclusions are given, no attempt is made to differentiate between carbohydrates and fats so long as sufficient is supplied to ensure the daily energy requirements. In point of fact, the proportions of the proximate principles in a diet in individual cases may and do differ appreciably from these standards without affecting the nutritional value of the diet, if the total energy supplied is adequate."

Dr. Hamill next deals with the amount of protein needed; he summarizes the various contentions and expresses a conservative opinion, pointing out that numerous recent investigations have "shown that the body can preserve health and vigour on a diet containing less protein than the standards of Voit, Rubner, and Atwater. In some cases amounts as low as 40 grams of protein a day appear to be sufficient to meet protein requirements." "Although such small amounts of protein," he observes, "seemed to be adequate to preserve health and even vigour in the cases under investigation, many competent observers regard it as undesirable to reduce the protein supply to such low limits on the ground that the margin of safety is too small to enable the organism to cope satisfactorily with the various adverse circumstances in which it may find itself placed from time to time. It is considered that one of the remote consequences of a diet extremely low in protein might be a lowered resistance to disease and general diminution in physical tone; furthermore, that persons accustomed to a very low protein intake would be unable to assimilate an increased amount when necessary, as in convalescence from wasting disease."

Dr. Hamill remarks that it is wise to be cautious in condemning a diet as inadequate merely because its yield in protein is below the conventional standard. He accepts, with certain reservations relating to the quality of the protein, the aphorism "take care of the calories and the protein will take care of itself" as a sound practical rule. In dealing with the differing biological values of protein from various sources he lays emphasis on the claims of milk; "the high biological value of the protein of milk makes it a food eminently suitable for the young when growth is rapid and the demands of the tissues for a supply of appropriate protein is urgent." The unsolved problem

[1] Diet in Relation to Normal Nutrition. By J. M. Hamill, O.B.E., M.D., D.Sc. 1921. H.M. Stationery Office. To be obtained through any bookseller, price 3d.

of the equivalence or non-equivalence of fat and carbohydrate in the normal diet is mentioned, and attention is directed to the recent work of Krogh and Linhard which suggests that the body performs work more economically when using carbohydrate as the fuel than upon fat.

After a brief statement of the mineral requirements of the body, the accessory food factors are discussed. Dr. Hamill provides a very clear summary of the facts which will be of great value to the intelligent layman. In the next section the salient physiological characteristics of some staple foodstuffs—bread, margarine, milk—are described. The report ends with some generalities which the man in the street might profitably get by heart. We may quote the concluding paragraph: "It is probable that much of what has been said in this report may need modification in the light of future discoveries. Knowledge of the principles underlying nutrition has been greatly extended as a result of recent research, but it is evident that much yet remains to be done. Progress in this work of nationa limportance can be attained only by unremitting observational and experimental inquiry. The problems awaiting investigation are amongst the most difficult which can be proposed for solution, and their elucidation may entail much labour and patient research. It was in this country, in the University of Cambridge, that the work which led to the two great dietetic conceptions—vitamins and the biological value of protein—largely had its origin; and it is only fitting that this country should continue to maintain its position in the world-wide search which is being vigorously prosecuted into the principles upon which sound nutrition and a rational system of dietetics can alone be based."

We are pessimistic enough to urge the same plea for less spiritual reasons. The people of this country depend for their daily bread upon the export of manufactured goods; many of their customers are temporarily, perhaps permanently, ruined; others can obtain the goods they need elsewhere. To enable us to live of our own, the population would have to be reduced by many millions. Hence the problem which may have to be solved is to reduce the population by emigration or to reduce its needs by economy. Clearly the largest item of expenditure is upon food; it has been estimated that 60 per cent. of working-class outgoings are spent on food. It may be possible, without lowering the standard of life in the popular sense, to reduce this expenditure. Numerous experiments have made it probable that under certain conditions the metabolic level, not only of protein consumption but of energy transformation, can be changed. The work of Benedict, Miles, Roth, and Smith[2] is an illustration. But, on the faith of these limited experiments, to prescribe for all classes a diet of appreciably lower energy yield than the ordinary standards would not be rational. We must ascertain by similar experiments on a much larger scale and under conditions more closely approximating to those of ordinary life whether the results are typical. This will need time and self-sacrifice on the part of members of the middle and upper classes. The most effective popular argument against prohibition is that, in America, the poor man is prevented from drinking, but the rich man may drink what he pleases. One can foresee what would be the fate of a propaganda for food economy conducted on similar lines. Those who are (at present) well above the poverty line must first demonstrate the practicability of maintaining health and efficiency upon such a diet as used by Benedict's subjects before any very large measure of economy of consumption can be expected. Such experimentation is a work of years, not of months, and should be planned forthwith.

[2] *Human Vitality and Efficiency under Prolonged Restricted Diet.* Carnegie Institute, Washington, 1919.

THE VICTOR HORSLEY MEMORIAL.

A MEETING of the Executive Committee of the subscribers to the "Victor Horsley Memorial Fund" was held at 1, Wimpole Street on Thursday, October 20th, with Sir Charles Ballance, K.C.M.G., F.R.C.S., in the chair. Sir Frederick Mott (honorary treasurer) reported that the amount of subscriptions promised was £1,025, of which £875 had been paid into the bank. There was little doubt that the whole amount promised would shortly be received, and it was probable that the interest on the deposit would be sufficient to defray the cost of printing and postage. The number of subscribers, exclusive of groups, was 229. The following recommendations from the Executive Subcommittee were received, and the chairman proposed that they should be adopted: (1) That the "Victor Horsley Memorial Fund" be invested in the names of a board of trustees consisting of the President of the Royal Society, the President of the Royal College of Surgeons of England, the President of the British Medical Association, the Senior Physician of the National Hospital for the Paralysed and Epileptic, Queen Square, the Senior Surgeon of University College Hospital, in virtue of their office, together with Mr. Edward Robinson (the son-in-law of Sir Victor Horsley) and Mr. Edward J. Domville, one of the honorary secretaries of the fund, the vacancies caused by the resignation or death of either or both of these last named not to be filled up. (2) That the trustees shall triennially appoint a lecturer to deliver a lecture in London, under the title of "The Victor Horsley Memorial Lecture." (3) That no limitation be placed on the trustees as to the country or profession from which the lecturer should be appointed, nor on the subject of the lecture to be delivered. The resolution for the adoption of the recommendations was seconded by Sir William Arbuthnot Lane, supported by Dr. George Murray, Dr. Mary Sturge, Mr. W. G. Spencer, and carried unanimously. A vote of thanks to Mr. Domville for his services as honorary secretary was carried by acclamation. It was resolved to close the list of subscriptions on December 31st.

TROPICAL MEDICINE IN THE EAST.

THE progress of tropical medicine in the East owes a good deal to the Far Eastern Association of Tropical Medicine It was founded in 1908 at a meeting held in the Philippine Medical School, Manila, and has as its object the promotion of the science and art of tropical medicine and of friendly international intercourse between physicians and scientists. It endeavours to raise the standard of medical education in the East, to enlighten and direct public opinion in regard to the problems of hygiene, to form habits conducing to the prevention of disease among the native populations, and to present to the world the results of scientific investigations. Meetings of the association are, as a rule, held biennially; thus the first congress was held at Manila in 1910, the second congress at Hong Kong in 1912, and the third congress at Saigon. The outbreak of war in 1914 prevented the holding of the meeting which it had been proposed should take place in Java in that year, and it was not until 1920 that preparations could be made to hold a congress at Weltervreden, Java. This, the fourth congress of the association, was officially opened at the Governor General's Palace, Weltervreden, on August 6th, 1921; delegates attended from the Straits Settlements and the Federated Malay States, the Philippines, Formosa, British India, Japan, Macao, Australia, and Siam, as well as from Java itself. Representatives also attended from the Malayan and the Queensland Branches of the British Medical Association, the Japanese Army Medical Corps,

the Kitasato Institute, the Dutch Society of Indian Practitioners, the Dutch-Indian Society for Veterinary Medicine, and the Society for the Advancement of Medicine in the Dutch Indies. At a series of meetings held in the Medical School at Batavia over seventy original papers were read and discussed, dealing with subjects, it is interesting to note, connected both with medical and veterinary science; the proceedings, including summaries of the papers, have now been published.[1] The final meeting of the medical congress took place on August 13th, when it was proposed to hold the next congress at Singapore in 1922. This proposal was carried unanimously, and Dr. A. E. Horn, of Singapore, was elected president, with Dr. O. Deggeler as secretary and treasurer. The following were elected vice-presidents and representatives of the Far Eastern Association of Tropical Medicine in the different areas: the Straits Settlements, Dr. Hoops and Dr. Scharff; the Federated Malay States, Drs. Dowden and Scharff; British India, Lieut.-Colonel W. F. Harvey, I.M.S., and Major S. R. Christophers, I.M.S.; Japan, Professor S. Hata and Dr. Nakyama; Saigon, Dr. Bridger; Siam, Prince Thawara and Dr. Phra Sakda; the Philippines, Drs. Rozario and Wade; Hong Kong, Dr. Johnson; Indo-China, Dr. Montel; and Java, Dr. Van Lonkhuyzen.

PAST AND PRESENT.

The address on "Past and Present: 1745–1900," which Dr. William Russell, Professor Emeritus of Clinical Medicine in Edinburgh, delivered last July as President of the Caledonian Medical Society, was a dissertation on the thesis that the thoughts of the men of one generation, their political and religious institutions, and the physical conditions under which they live, rest on the modes of thought and manner of life of their predecessors. It is very well to be reminded of this, for though no one will seriously dispute its truth, even the most sober-minded of us are a little apt to be carried away by some enthusiastic orator who talks of a new world or a new era. Professor Russell briefly described some of the material changes which came over Scotland during the period with which he was concerned. During this time the depopulation of the rural districts advanced at a great rate, owing in part to the commercialization of agricultural methods, and in part to the attractions of manufacturing towns and of countries with more genial climates and less antiquated land laws. In 1745 Inverness, the capital of the Highlands, consisted mainly of thatched hovels built of stone and turf; the country habitations, too, both north and south of the Grampians, were all, or nearly all, of this type. To the people who left their farms and crofts the habitations they found in Edinburgh and Glasgow, and in English towns, built of stone and roofed with tiles or slates, seemed comparatively luxurious; yet within half a century they were looked at askance and were condemned by the first medical officers of health as unfit for human habitation. Again, that women should carry peats to the peat stack for the winter's fuel, and that the young people should help in all work on the croft, did not shock the public sense of what was right; but when woman and child labour became massed in mills and in coal-pits Parliament was moved to pass Acts regulating their employment, and sanitary legislation grew up. Medical men who have entered public life will have all this in mind; and Professor Russell recognized that an educated profession, trained to observe correctly and to make reasonable deductions, would have a wide influence on public bodies if its members informed themselves on current matters of controversy. "If," he said, "the medical profession adopted as an intellectual pastime the study of history and of economics, as these subjects are now intelligibly taught, the definite entry of the profession into public life might be fraught with much good, and the reconstruction of which we have had so much flamboyant rhetoric, might be really furthered." As textbooks Professor Russell suggested *The Revival of Marxism*, by Professor Shield Nicholson, the *New Fallacies of Midas*, by Cyril Robinson, and *Liberalism and Industry*, by Professor Ramsay Muir. He quotes from the latter the statement that "all genuine human progress must arise out of the past, and preserve and build upon whatever good has been brought out by our predecessors; it must be guided by loyalty to facts, not by a credulous, excited trust in the mushroom and evanescent theories of the moment, although it may draw inspiration even from them." "It is," Professor Russell said in ending this part of his address, "this guidance of knowledge and of principles we seek, not the makeshifts of opportunism." In the concluding paragraphs of his address he said something of the history of medicine during the period with which he was dealing, insisting upon the reversion in recent years to the earlier doctrine, to be found in Forbes's English translation (1838) of Laënnec's *Mediate Auscultation* (1819) that "the disturbance of the functions is in fact, properly speaking, disease." A review of the medical history of the nineteenth century would, Professor Russell said, make it evident that the recognition of the beginnings of disease and the intelligent recognition of established disease required accurate knowledge of the institutes of medicine defined by Allison (1833) as "the information collected and generalized with regard to the functions of the living human body as performed during health, as altered by disease, and as influenced by remedies." Accurate observation by the individual was necessary, and it was by improvements in the means of observation that the field of medicine had mainly been extended since Cullen wrote in 1783. Finally, a medical practitioner must possess the judicial faculty, and for its proper exercise must have a knowledge of normal functions; otherwise "aberration of function will not be recognized, and aberration of function may be the first step of what we call disease."

[1] Batavia: Javasche Boekhandel and Drukkerij, 1921.

SYMBIOSIS AND DISEASE.

In a Chadwick Lecture on plant diseases, given in the Lecture Room of the Chelsea Physic Garden by Dr. V. H. Blackman, F.R.S., professor of plant physiology and pathology in the Imperial College of Science, the very wide range in the degree of association of the host and the parasitic organisms among plants was insisted on. At the one extreme, Professor Blackman said, was the condition in which the fungus was almost purely superficial and the injurious effect mainly indirect; at the other were associations which appeared to have passed altogether out of the realm of disease, for both organisms benefited. Between the two extremes were all degrees of association; for example, the fungus *Botrytis cinerea* produced an enzyme which dissolved the cells of the host, killing them in advance of the branches of the invading organism, which thus lived actually upon dead tissue. The rust fungi which attacked cereals lived at first in symbiosis with the host, which was not injured; there was in fact an association to mutual advantage, the fungus was nourished and the cells of the host plant stimulated to active growth and division. Later on the fungus gained the upper hand and the tissues of the host were destroyed. These cereal rusts were to be looked upon as the most highly evolved conditions of true disease. Above this were symbiotic associations, such as the root tubercles of the leguminosae, in which the host plant was the dominant partner throughout. No case of disease in plants was known in which immunity to further attacks was produced; cells once penetrated were nearly always killed. Plants generally depended for freedom from disease on their capacity to keep the parasite out or to surround it and render it harmless by enclosing it with layers of cork. The immunity of certain wheats to rust

disease had, however, been shown to be due to the "hypersensitiveness" of the tissues, which succumb so rapidly to the attack of the fungus that the parasite was starved. It was only in cases of symbiotic association that there had been observed any digestion of the invading organism—that is, of a process comparable at all to phagocytosis in animals; in the orchids also there was evidence that plants once infected were immune to further attack. No production by the attacked plant of lethal substances comparable with antitoxins, bacteriolysins, etc., had been observed. Even if it occurred the absence in plants of any reservoir comparable with the animal blood stream would make their detection very difficult. The artificial immunization of plants by the use of vaccines or serums would seem to be very unlikely. Apart from the difficulty of distributing such vaccines to the various organs, there was the difficulty that the growing plant was continually producing new organs. Thus to be effective the acquired immunity would have to be transmitted to what was in many ways comparable with a new generation. Professor Blackman concluded by saying that since disease is abnormal physiology—the resultant of the interaction of the physiological processes of the host and the parasite—it was not to be expected that much progress in the elucidation of the nature of disease could be made without further knowledge of the normal physiological processes of the associated organisms.

VIENNESE CHILDREN.

IT is a little difficult, from the account he has published in the *Glasgow Medical Journal*, to get a distinct impression of what Dr. Leonard Findlay found when he went to Vienna last Easter in connexion with the work on rickets which is being done in Glasgow under the auspices of the Medical Research Council. He found the streets filled with elegantly dressed men and women, magnificent motor cars rolled by, cafés were full of people eating and drinking, and the opera house was packed to see performances magnificently staged. On the other hand, the furnishings of the cafés were shabby, the tramcars wanted painting, the streets needed repair, and Austrians declared that the people who were spending money lavishly were not Austrians; there could be no doubt that the value of the krone had decreased enormously, so that Austrian currency was one-hundredth of its pre-war value—2,500 kronen or more being obtainable for the £1, instead of 25. Wages, on the other hand, had risen, and the working man was earning from 300 to 500 kronen a day—equal to about 2s. to 4s. at the present rate of exchange. The salaries of clerks and teachers had increased, as had also pensions, but the increases had been so small that the incomes received bore no sort of relation to the increase in prices. The conditions for pensioners, and for black-coated folk generally, were almost incredibly bad, and the scale on which relief in such cases is given by the English and American missions would seem to be quite inadequate. On the other hand, Dr. Findlay tells us that he was impressed by the apparent good health of the children he saw in the different parts of the town; playing in the open spaces they looked perfectly happy, had a good colour, seemed plump, and had straight legs. It is to be remembered that for the preceding eighteen months all children and young persons up to the age of 18 years had been receiving rations equal to one-third of their needs from British, American, and Dutch charitable agencies. The amounts of food given were based on Pirquet's nem system, a full account of which was given in our issue of October 30th, 1920, p. 666. Dr. Findlay observes that the important point about the system is that the needs of the body are estimated, not according to the surface area, but to the absorptive surface of the intestine as gauged by the length of the trunk, or the "sitting height." He seems to think that the method is a success and better than the older plan, which implied that food is given to make up for heat loss from the body surface, and not to supply fuel for the engines of the body. After visiting many child welfare clinics and children's hospitals, Dr. Findlay came to the conclusion that, if anything, rickets was, last Easter, less prevalent in Vienna than in Glasgow. He discounts the accuracy of many statements made by medical men in Vienna, as, for instance, that of Spitzy, the orthopaedic surgeon, that rickets is a thousand times more frequent than it was. He recalls that Kassowitz in 1910 estimated that 89 per cent. of the children attending his polyclinic in Vienna were rickety. Much of the medical writing in Vienna, Dr. Findlay says, has at the present moment a political purpose; in order to justify the existence of foreign help, and to demonstrate the benefit accruing from such help, the Health Office of Vienna invited medical men to state the condition of the children before and after, and said that as rickets is a nutritional disease it would form a good and striking index. The Health Office writer added that at first difficulty was experienced in getting medical men to send in returns, but that afterwards they appreciated the political value of such statistics and supplied full figures. As Dr. Findlay does not hold the view that rickets is a nutritional disease he is not much impressed, and got no unanimous answer in Vienna to this etiological question. Pirquet thinks that rickets may be of the nature of an infection; Luger considers that it is due to disease of a ductless gland. Pirquet considers fat is unnecessary as a constituent of the diet for children, and, owing to the scarcity of milk and the high cost of fat, "many of his children were being fed on a diet which, according to our ideas, is poor in fat and unduly rich in carbohydrate." Dr. Findlay refers to the investigations of Dr. Chick and her colleagues, which at the time of his visit were not completed. "I did not," he goes on, "gain any evidence specially incriminating diet as the etiological factor in rickets." He describes the housing conditions of the working classes in Vienna, even in modern model dwellings, as very bad, and he thinks that the crowding which existed before the war may have been increased during and since the war. While he could not convince himself that rickets in infancy and early childhood was more prevalent now than before the war, or even as common as it is in Glasgow, he has no doubt as to the increased frequency in Vienna of late rickets, understanding by that the disease commencing after the fourth year, and even as late as puberty. Prior to the war, he says, this was a very rare condition and seldom did any one observer see more than three or four examples during a decade. When he was in Vienna he found in most clinics evidence from *x*-ray photographs of 6 to 10 cases occurring during a period of eighteen months; some of the cases might be questionable, but some were quite definite. With regard to osteomalacia, Dr. Findlay thought that all who were concerned with adult medicine were convinced that they were in the presence of a new form of epidemic disease, characterized by pain in the limbs, head, and ribs, difficulty in walking, and atrophy and diminished density of the bone, as evidenced by *x*-ray photographs. Spontaneous fractures occurred, but not such deformities as are present in puerperal osteomalacia, so that the similarity of the condition to senile osteomalacia or osteoporosis was very apparent. It made its first appearance in Vienna in 1918, the year following the epidemic of hunger oedema, and is generally spoken of as hunger osteomalacia. Schlesinger considers it to be due to the absence of some vitamin, but other writers blame deficient albumin in the diet. Inspection of many bedridden old women, in whom the diagnosis of osteomalacia had been made, sent Dr. Findlay away with the impression that any patient complaining of pains in the ribs and limbs would be diagnosed as an example of osteomalacia, much in the same way as in this country a

diagnosis of chronic rheumatism would be made. Indeed, the diagnosis of rheumatism instead of osteomalacia was, for political reasons, made in at least one institution in Vienna. Clearly, then, the practised observer with unusual opportunities may find it difficult to interpret what is to be observed in Vienna. Dr. Findlay, however, definitely expresses the opinion that the descriptions of the state of matters prevailing in Vienna given by the Save the Children Fund "are nothing short of gross exaggerations, and can only in the end bring discredit and distrust on the organization and its supporters. Matters, in truth, are quite bad enough without exaggerating them."

THE DEFENCE OF RESEARCH.

The October number of *The Fight Against Disease*, the quarterly journal of the Research Defence Society, contains the address in defence of the directly experimental method upon animals which Dr. H. H. Dale delivered at the annual meeting of the society last June, a full report of which was published in our issue of July 9th (p. 40). Dr. Dale, it will be remembered, referred at length to the work which is being carried on at the National Institute for Medical Research, instancing that on bacteriological media, on tetanus and silicosis, and on disseminated sclerosis. Another important branch of work which a department of the National Institute is performing is the control, in order to ensure their activity and freedom from dangerous toxicity, of such modern potent remedies as salvarsan and its analogues, which cannot be guaranteed safe for use in human therapeutics by any known chemical test. These remedies were, of course, discovered by means of experiments on animals, and there is a large and growing class of them which could, not be used with confidence and safety for the patient if they were not tested, regularly and systematically by experiment on animals. The duty of research workers, Dr. Dale pointed out, is to devote their time and attention to investigation and not to controversy with ignorance; he therefore warmly welcomed the efforts of the society to develop a sane and informed public opinion. This issue of *The Fight Against Disease* contains also an article on the outbreak of small-pox in Glasgow in 1920, in the course of which attention is called to notes of a recent sermon published by the Vicar of St. Jude's, Hampstead Garden Suburb, containing the mischievous suggestion that medical officers of health recommend vaccination and inoculations as a panacea for the ills caused by overcrowding and imperfect sanitation, which, he said, they accepted as necessary evils. On the contrary, as is here pointed out, every medical officer in the land is working hard for the very reforms of which the Vicar of Hampstead Garden Suburb is only talking. The Research Defence Society has naturally lost many members since 1914, when it was 5,000 strong, and it should appeal in a special degree to the medical profession, which can fully understand its aims. The annual subscription is 10s., which may be paid to the secretary at 11, Chandos Street, W.1.

SOCIETY OF MEDICAL OFFICERS OF HEALTH.

The annual meeting of the Society of Medical Officers of Health was held on October 21st, when the new President, Dr. W. J. Howarth, M.O.H. for the City of London, gave his introductory address on "Some Reflections on Public Health Problems." Discussing the treatment work now undertaken by local authorities, he pointed out three objections: it tended to place the local authority in competition with the general practitioner and the Poor Law; it led to the creation of clinical appointments offering no substantial inducement to the holders to regard them as permanent; and it lowered the skill of general practitioners by limiting their opportunities for acquiring certain kinds of experience. Thus it came about that two groups of practitioners were working along lines that were not parallel. The preventive practitioner devoted his chief energies, so far as the individual members of the community were concerned, to conditions discovered mainly below the age of 14. The curative practitioner exercised his skill mainly on persons over the age of 16, and in circumstances which did not tend to fill him with enthusiasm for preventive work. The two branches of practice should no longer be separated by watertight compartments. The annual dinner of the society was held on the same evening at the Café Royal, with the President in the chair. The toast of "Prosperity to the Society of Medical Officers of Health" was proposed, in the absence of the Minister of Health, by Mr. J. W. Pratt, M.P., Vice-President of the Scottish Board of Health, who described the society as the general staff of the army fighting against disease. The President prefaced his reply by reading a message from Sir Alfred Mond, conveying high appreciation of the work of the medical officers of health, and expressing the hope that the present need for stringent financial economy might not unduly discourage them in their work. The toast of "Pulpit, Parliament, and the Public Health," submitted in a brief but telling speech by Sir George Newman, was responded to by the Bishop of London, who spoke of his long and close association with the medical profession; and by Sir Philip Magnus, M.P. for the University of London, who has been elected an Honorary Fellow of the Society in recognition of his exertions in obtaining security of tenure for medical officers of health. The health of "The Visitors" was proposed by Dr. F. E. Fremantle, M.P., who made special mention of the presence of Sir Aston Webb, P.R.A., Sir Anthony Bowlby, P.R.C.S., Sir Arthur Robinson, Secretary of the Ministry of Health, and Dr. T. W. H. Garstang, Chairman of the Public Health Committee of the British Medical Association. The toast was replied to by Professor C. S. Sherrington, M.D., President of the Royal Society, who spoke of the scientific work of the medical officer of health, the close connexion between natural knowledge and national health, and the artificiality of the distinction drawn between pure and applied science.

INTERNATIONAL ASSOCIATION OF THE HISTORY OF MEDICINE.

An International Association of the History of Medicine was founded at a meeting held at the Faculty of Medicine, Paris, on October 8th. The International Congress of the History of Medicine met for the first time in Antwerp in 1920; it met again in Paris last July, when a committee was appointed to draw up a constitution for an International Association of the History of Medicine, the object of which should be to institute bibliographical and other inquiries in preparation for discussion at future international congresses, and to suggest subjects for research and investigation so as to ensure continuity. At the meeting on October 8th, at which Professor Jeanselme of Paris took the chair, Professor Laignel-Lavastine, General Secretary of the Faculty of Medicine of Paris, submitted a draft constitution, and it was decided that the permanent committee of the association should consist of a president, vice-presidents, secretary and treasurer, and delegates from each country. Dr. Tricot-Royer (Antwerp) was elected president, Dr. Charles Singer (Great Britain) and Professors Giordano (Italy) and Menetrier and Jeanselme (France) were chosen vice-presidents; Dr. Fosseyeux was appointed archivist and secretary, and Dr. Boulanger, treasurer, of the permanent committee. Dr. Singer, speaking in the name of the Section of the History of Medicine of the Royal Society of Medicine, invited the International Congress to hold its third meeting in London next year; the invitation was cordially accepted, and the date provisionally fixed for July 24th to July 29th. The subjects suggested for discussion at the congress were: The principal seats of endemic and epidemic diseases in the classical Orient during the Middle Ages; the history of anatomy; and the

revival of medical knowledge during the sixteenth century. The draft by-laws of the association will be submitted to the permanent committee at a meeting which it is expected will be held in December next.

THE social evenings of the Royal Society of Medicine will be resumed on Monday next, October 31st, when Fellows and their friends will be received by the president, Sir John Bland-Sutton, and Lady Bland-Sutton, at 8.30 p.m. The library will be open, various objects of interest will be exhibited, and at 9 p.m. the president will deliver a short address on choroid plexuses and psammomas. There will be music, light refreshments, and smoking. Fellows may themselves invite friends of either sex; tickets are not required.

Medical Notes in Parliament.

[FROM OUR PARLIAMENTARY CORRESPONDENT.]

National Insurance Acts.

SIR E. NICHOLL asked, on October 24th, whether, in view of the dissatisfaction with the working of the National Insurance Acts, the Minister of Health would consider the advisability of their early removal from the statute book. Sir Alfred Mond replied that he was aware that there was periodical criticism of certain aspects of the scheme embodied in the Insurance Acts, but, on the whole, all the evidence tended to show that National Insurance had been most beneficial in its operation. While he was considering the advisability of inquiring what improvement could be effected in its working there could be no question of repeal. Mr. Hayward asked the Minister what were the total contributions of the State, employers, and employed respectively, under the Insurance Acts for the last complete financial year; and what were the total administrative and working expenses under all heads for the same period, apart from payment made in respect of medical attendance, drugs and other benefits. Sir A. Mond said the totals were (in round figures) for the year 1920, as respects England and Wales, as follows:

	£
Total contributions—	
By State	8,800,000
By employers	9,800,000
By employed	10,300,000
Total administrative and working expenses under all heads	£4,500,000

Milk Grant to be Continued.—Viscountess Astor asked if the Minister of Health had received protests against his decision to reduce the Government financial aid to local authorities for the provision of milk to infants and mothers; and whether he could reconsider the matter so as to give once again half the cost in cases where the medical officer of the local authority issues a certificate of need or where some other suitable safeguard against unnecessary expenditure was provided. Mr. Myers and Captain Coote also put questions. Sir A. Mond replied that the very great increase in this service by local authorities had caused the estimate of the Government grant during the financial year already to be exceeded, and on strictly financial grounds severe reduction was entirely justified, but in view of the commitments of local authorities during this financial year and the distress existing from the extent of unemployment, he had decided that the 50 per cent. grant for milk supplied free, or at less than cost price, under the conditions laid down in Circular 185, should be continued until the end of the financial year.

Guardianship of Infants Bill.—In reply to Lady Astor, on October 20th, Mr. Lloyd George expressed regret that it would be impossible to deal with this bill during the present session, as only unemployment legislation was being taken.

Appointment of Medical Referees.—Sir Walter de Frece asked, on October 20th, whether the Minister of Health would undertake to give preference to all candidates applying for the post of medical referee who had served in the war, even if their absence from home in the service of the State naturally gave them a shorter record of home service in the district. Sir A. Mond said preference was given to men who had served in the war, other things being equal, but with due regard to the fact that many practitioners who did not serve in the armed forces had applied for such service and been kept at home by the decision of the competent authorities that their services were indispensable for the needs of the civil population.

Children's Health.—In answer to Mr. Lyle, on October 20th, Sir A. Mond could not say from information at his disposal that there had been an increase of sickness among children as a result of short time and unemployment.

England and Wales.

LIVERPOOL MEDICAL INSTITUTION.

THE inauguration of the eighty-third session of the Liverpool Medical Institution took place on October 20th, when there was a large attendance of members and associates, and the president, Dr. John E. Gemmell, delivered an address on the subject of "Books and some of the treasures of the Institution library." Quoting John Milton in praise of books, and alluding to the quaint views of older authors and writers on the value of books and the happiness they bring with them, he said that it was by no means universal that a first edition was most valued, as, apart from the author, much depended on the publisher, the time, and the place of the work, and in medicine the position occupied by the author among the fathers of medicine. The library of the Medical Institution now contained 15,100 books, but from 1914 to 1920, during the great war, practically no additions were made. Mascagni's *Anatomical Atlas* had the place of honour of being the largest book, and the *Aphorisms* of Hippocrates the smallest in the collection. Jenner's work on variola, published in 1798, was one of its most treasured books, dealing as it did with the origin of vaccination. The library possessed Harvey's *De Motu Cordis*, 1654, and works by Cheselden, Vesalius, Hunter, and Eustachius. The last work was the first to be illustrated with copper engravings of the anatomy of the human body.

The President hoped that the endowment fund of the library which had been started a year ago would commend itself to the members, and that always the library would continue to be the chief attraction, as, indeed, it was the foundation of the Liverpool Medical Institution. The address was much appreciated, and a vote of thanks, proposed by Dr. Richard Caton and seconded by Mr. W. Thelwall Thomas, was carried with acclamation.

ANNUAL MEDICAL SERVICE AT LIVERPOOL.

The annual medical service was held at St. Luke's Church, Liverpool, on October 23rd, when there was a large attendance of the medical profession, and it was worthy of note that academic dress was worn by many more than on previous occasions. The Lord Mayor of the city, accompanied by the Lady Mayoress, attended in state, and the church was filled. The Very Rev. Dean Inge, of St. Paul's Cathedral, preached the sermon, the Bishop of Liverpool read the lesson, and the Rev. A. J. Macdonald, vicar of St. Luke's, conducted the service. The Dean took his text from Matt. ix, 12, and based a striking sermon on the twofold aspect of Jesus being a bodily as well as a spiritual healer. He pleaded for a closer understanding between and combined effort of medical and theological healers. He cited how in medical works aberration of conduct was referred to degeneration and morbid states of the nervous system and in religious manuals sin, repentance, and conversion were also regarded as states of spiritual phases. Moral and physical sickness should not be kept apart in our treatment, and theological conceptions might well be advanced in clarity were the psychology of temptation discussed in a thoroughly scientific spirit by truly religious minds. In conclusion, the Dean alluded to the fallacies of spiritual healing and its claim to work cures which science pronounced to be impossible. He regarded this fashionable tendency to dabble in supernaturalism as a regression to the barbarous Middle Ages, which would bring deep discredit on any religious body that tried to exploit it. The offertory was made on behalf of the Royal Medical Fund for the Liverpool district. As many medical men were prevented from contributing, it may be stated that the Fund is not closed yet, and the Medical Service Committee will be very grateful if they would forward their donations to the local treasurer, Dr. J. Ernest Nevins, 32, Prince's Avenue, Liverpool.

NEWCASTLE-ON-TYNE: OPENING OF THE SESSION.

The course of post-graduate lectures and demonstrations for the Michaelmas term commenced on Thursday, October 13th. The classes which have been arranged are as follows: Clinical Medicine, Dr. W. E. Hume, C.M.G., and Dr. A. Parkin; Diseases of the Throat, Nose and Ear

Mr. S. S. Whillis and Mr. W. F. Wilson; Clinical Pathology, Professor Stuart McDonald and Dr. F. Bernard Shaw; X-Ray and Electrical Treatment, Dr. W. D. Arnison; Midwifery and Gynaecology, Professor R. P. Ranken Lyle; Neurology, Dr. George Hall. Thirty-six practitioners have entered for the various classes, which will meet every Thursday up to and including December 15th.

The Newcastle-upon-Tyne and Northern Counties Medical Society held its first meeting of the new session in the Royal Victoria Infirmary on October 13th. The president, Mr. S. S. Whillis, was in the chair. Various cases were shown by Dr. Beattie (polycythaemia), Dr. Horsley Drummond, and Dr. Hume; Mr. Leech and Mr. Johnston showed cases illustrating sarcoma.

Bristol Royal Infirmary.

At the half-yearly Board of Governors of the Bristol Royal Infirmary, held on October 13th, the announcement of the resignation of the president, Mr. H. H. Wills, was received with the greatest regret. Ill health has compelled Mr. Wills to take this course. During his tenure of office his interest and energy on behalf of the institution have been invaluable, whilst his generous gift of £100,000 in the early part of this year has made a substantial difference to the financial difficulties with which the infirmary, like all other voluntary hospitals, was faced.

Mr. Henry Arthur Siepmann has founded at the Bristol Royal Infirmary an annual prize of the value of £50 to perpetuate the memory of his sister, Miss Phyllis Siepmann, who died in 1920 from septicaemia contracted whilst discharging her duties as a surgical dresser at the infirmary. The prize will be awarded annually to that student who, in the third year of attendance at the Royal Infirmary, shall do best in an examination in medicine and surgery with special reference to diseases of children.

Frenchay Sanatorium, Bristol.

On October 5th Sir William Treloar performed the opening ceremony of Frenchay Park Sanatorium. He was supported by the Lord Mayor of Bristol (Mr. G. B. Britton) and many representative citizens. In his speech, which was full of wise and witty remarks, Sir William gave a short account of the initial difficulties and ultimate success of the homes he founded at Alton and Hayling Island for crippled children. His record of 90 per cent. of successfully treated cases evoked great enthusiasm and will undoubtedly act as an incentive and encouragement to the Bristol Health Committee to press on with the completion of their scheme for dealing with tuberculosis in the city. When the economic situation permits the construction at Frenchay of the open-air wards for 100 children and the linking up with Alton as contemplated, Bristol will have sound reason for satisfaction and pride in having begun seriously to grapple with one of the most urgent problems of public health. The present cautious policy as regards expenditure is not due to lack of belief in its own scheme, but has been forced upon the town council by the parlous state of public finance and the restraining hand of the Ministry of Health.

Ireland.

Professor Lindsay of Belfast.

On his retirement from the active visiting staff of the Royal Victoria Hospital, Belfast, his brethren on the visiting staff presented Professor James A. Lindsay, M.D., F.R.C.P.Lond., with a beautiful silver Irish dish ring. Dish rings were originally used as stands on which the wooden bowls containing potatoes were served at table, and after dinner, in the same way, for the punch-bowl. The ring presented to Professor Lindsay is a very beautiful modern reproduction. He was entertained to dinner on October 13th, when Mr. Mitchell, F.R.C.S.I., senior member of the staff, in the unavoidable absence of the chairman, Professor Sinclair, C.B., F.R.C.S.Eng., presided. After the customary loyal toast, he proposed the health of the guest of the evening in a happy and feeling speech: whether for his learning and culture, his clinical teaching, his ability at the bedside, or his uprightness and personal claims, all, Mr. Mitchell said, had learnt to esteem their guest and hold him in their affection. Dr. Lindsay thanked all for their kindness, both for the gift and also for the sentiments and wishes. He remarked on the advances made by medicine since he was a student, and said that the times gave promise of still further progress.

At the invitation of the medical staff, and with the consent of the Board of Management, Professor Lindsay will give fortnightly clinical lectures or demonstrations at the Royal Victoria Hospital this winter.

Correspondence.

NATIONAL PROVIDENT SCHEME FOR HOSPITAL AND ADDITIONAL MEDICAL SERVICES.

Sir,—It would not be within my province to defend the British Medical Journal against the attack made upon it by Dr. Muir Smith in his letter in the Supplement of October 22nd (p. 155), but as his attack is also directed against the National Provident Scheme, and as he appears to have experienced some difficulty in obtaining precise information, perhaps it might clear the ground if, as honorary secretary to the committee, I might be allowed to state a few actual facts.

The National Provident Scheme for Hospital and Additional Medical Services owes its inception to a conference of the chairmen, house governors, and secretaries of the principal London hospitals, which was convened by Sir Arthur Stanley at St. Thomas's Hospital on January 25th, 1921, to consider certain proposals with regard to a provident organization in London. After considerable discussion these proposals were submitted to the British Medical Association, and referred to the Metropolitan Branch Council. As the result of its consideration at two meetings of the General Purposes Committee of the Branch Council the matter was referred to a special committee appointed for the purpose, consisting of consultants and general practitioners in equal numbers. After making certain amendments this special committee recommended the scheme to the Branch Council, who approved it, and printed and circulated it to all of their Divisions, and to all the London hospitals.

It is greatly to be deplored that they had not the help and advice of country practitioners in taking this step, but, after all, it was London which was mainly concerned, and perhaps the excuse suggested by Dr. Muir Smith himself for the Organizing Committee, "that exigencies of their objective" might "justify the urgency of their action," could be also pleaded by the Metropolitan Branch Council.

Meantime an Organizing and Executive Committee was formed with the object in view of helping to establish the scheme on similar lines, and with mutual reciprocity, in any areas of the country which desired it, and a Medical Consultative Committee was also formed, of which at least half the members are also members of the Council of the British Medical Association. The principle upon which the Organizing and Executive Committee of the scheme have always acted, and will continue to act, is that no step of importance shall be taken until the medical profession has been consulted about it.

I will not trespass upon your space by replying in full to Dr. Muir Smith's letter, which is best answered by the details of the scheme itself, but one paragraph might perhaps be quoted as an example of the rest. It runs as follows:

> "Stripped of its sentimental embellishments this scheme is nothing more or less than a glorified form of club practice, masquerading in the guise of hospital philanthropy, and is potential of perpetuating and intensifying all the abuses inherent in every form of capitation practice."

The author of this portentous paragraph very truly goes on to say "that this aspect of the question has apparently been overlooked." His fears will disappear when he learns that the Provident Scheme does not provide ordinary—that is, general practitioner—treatment, that it is from the first consultative, and that its services can only be obtained through a member's own doctor. In fact, it does not provide any of the services of a club practice, and few, if any, of the services which it does provide were ever undertaken by the doctor of a club.

The first tidings of any happening are proverbially

inaccurate, but it is pleasant to learn that rumours about the National Provident Scheme are penetrating into various parts of the country, and the committee of the scheme may perhaps be justified in hoping that when Dr. Muir Smith has been more fully informed they may look to a man of his influence and eminence in the profession for help and sympathetic advice in their effort to solve a very difficult problem.—I am, etc.,

Fenchurch Avenue, E.C.3, Oct. 24th. J. F. Gordon Dill.

Sir,—I have read with astonishment a letter in the Supplement to the British Medical Journal of October 22nd, headed "National Provident Hospital Organization," and signed by Wm. Muir Smith, Hon. Sec. and representative A.R.M., Eastbourne Division, and although I will not attempt to argue against the criticisms of the National Provident Scheme which are contained in the letter—Dr. Muir Smith has as much right to his own opinion as anyone else—I would crave for a little space to correct some gross misstatements as far as Sussex is concerned.

The name "*Sussex* Provident Scheme" was adopted (1) because it was intended from the first to embrace all the voluntary hospitals in Sussex who were willing to join; (2) because the Royal Sussex County Hospital, which draws its patients from all parts of the county, was the first to adopt it; and (3) because the membership was limited to bona fide residents in Sussex.

A start had to be made somewhere, but as soon as the scheme had been successfully launched in the Brighton district, an invitation was sent to every hospital of repute in the county that we could hear of to co-operate with us. I much regret to learn that the "Eastbourne Ear, Nose and Throat Hospital" and the "Eastbourne Eye Hospital" were not included in the invitation. The omission was not intentional, but none of the committee knew of the existence of these institutions, nor were they mentioned in the copy of the *Medical Directory* from which the list was taken.

The proposals were submitted to five separate meetings of various sections of the profession in the district called especially to consider them, and after being amended in several directions were approved by them all, and yet we are told that "the scheme is unacceptable to the local profession." The reasons given for this are:

(*a*) That "it is controlled by a small section of class practitioners—a Brighton caucus—which is in no way representative of the profession in the county."

There is not a word of truth in this. The committee at present consists entirely of lay members, although a distinguished consulting physician has within the last few days been invited to join it.

(*b*) That it "is comprised of nine co-operating hospitals, all situated in Brighton, Hove, and Preston, whereby the centre of gravity for such services will always be Brighton."

This will obviously be the case as long as the other hospitals in the county stand aloof.

(*c*) That it "contains no provision for utilizing the resources of any other hospital hereafter willing to co-operate."

This is not true, inasmuch as all the other hospitals in the county are invited to co-operate as from January 1st, 1922, when the financial arrangements will be re-settled.

(*d*) That "being avowedly designed 'for the benefit of those who, being bona fide residents in Sussex, irrespective of class of occupation, are in a financial position which makes them eligible for election as members,' ostentatiously seeks to attract and annex to its membership two classes of persons who, with incomes of £400 and £500 as respectively described under Grades II and III of the prospectus, have hitherto been able to afford the private fee usually charged for such services and whose claims to semi-charitable consideration have neither been demanded, urged, or established."

This paragraph is wholly misleading. In the first place Grades II and III do not describe individual members. These are represented in Grade I, which is for single members with an income limit of £260. Grade II represents a man and his wife, or a widow or widower with one child, who cannot become members separately, but whose joint income does not exceed £400. Grade III applies to families, who also must all become members together, and whose collective income does not exceed £500.

Incidentally these income limits were suggested by the Brighton Panel Committee, and were agreed to at all the meetings which were held. The scheme is intended for those people who now use the hospitals, and who are at present being charged for part of the cost of their maintenance. It is true that it opens the door to a section of the new poor and of the black-coated class who have hitherto been too proud to use the hospitals; but these people are often far more needy than the industrial workers, and in any case members cannot receive any of the services offered by the scheme except through the agency of their private doctor, nor does the scheme provide its members with any ordinary (general practitioner) treatment.

(*e*) That "in thus creating a new and superior type of hospital beneficiary there is a grave danger that the treatment of these members demanded under a definite contract will, sooner or later, only be effected to the exclusion of those impecunious cases for whose benefit voluntary hospitals were originally founded."

This danger is purely imaginary. The members of the scheme have only such privilege of priority as the hospitals can give them without interfering with their routine and without detriment to more urgent cases, and there is a rule to the effect that when the limit of capacity of the hospitals has been reached the list of members will be closed.

(*f*) That it "will jeopardize the maintenance of voluntary hospitals on a charitable basis."

The provident scheme is hardly applicable to those hospitals who continue to administer an indiscriminate charity, and the maintenance of voluntary hospitals upon this completely charitable basis had already been proved impossible in the majority of cases.

(*g*) That "the inducement printed at the bottom of the prospectus, that 'the first ten thousand members will receive an "original member's" card, and that their subscriptions will not be raised while they continue members,' very much savours of astute commercial enterprise, which form of advertising is foreign to the best traditions of the profession and inconsistent with the ethical canons of professional conduct."

The Provident Scheme is not a commercial enterprise. Sixpence in the pound covers the cost of administration, and the remaining 19s. 6d. goes to the hospitals and to the medical profession for the services rendered. If advertisement there be—and there would be a great deal more if the money were forthcoming—it is not the medical profession which is being advertised nor the hospitals (although the latter are used to it and live on it), but the advantages to be gained under the scheme.

The best answer to the remainder of your correspondent's long letter will be found in the details of the scheme, which you have already published in full, and those of your readers who care to study them will, no doubt, share my amazement that a policy designed with a view to the best interests of the hospitals, of the medical profession, and of the hospital public, can have been so ingeniously misunderstood and misrepresented.—I am, etc.,

Selby,
4, St. George's Place, Brighton, Oct. 24th. Honorary Secretary.

Sir,—Dr. Muir Smith's letter in your issue of October 22nd (Supplement, p. 155) deals with two distinct issues, namely: (1) the merits of the above-named scheme, and (2) the relations of the British Medical Association to the proposals. With the former discussion I am not for the moment directly concerned, though I perhaps may be allowed to say in passing that with Dr. Muir Smith's criticisms I find myself in substantial agreement, and that, at least in my judgement, he has done good service in stating them.

On the second topic raised in the letter there is, I think, need for plain speech, for undoubtedly—presumably as the result of misunderstanding—there are quarters in which the British Medical Association is quoted, entirely without warrant, as in full support of the Hospital Provident Scheme. Within the last few weeks I myself have listened to an address in which one of the promoters of the scheme told his audience that the proposals had the support of a "committee appointed by the British Medical Association"; I have read an official record which declared that at a certain professional discussion there was present a gentleman "representing a committee of the British Medical Association"; and I have been presented with what purported to be a draft of a "Suggested organization for London," bearing

without qualification the address "429, Strand, W.C." On the other side is the hard fact that neither in the Representative Body nor in the Council has the Association even considered the scheme, much less endorsed it. All that has happened is that, on the recommendation of an *ad hoc* committee a majority of the Metropolitan Counties Branch Council has approved the proposals and ordered the circulation of them in a limited constituency. The Branch itself has not been consulted nor—with, I believe, two or three exceptions—have its constituent Divisions. How it has come about that on so slender a basis there has been erected the suggestion that the enterprise enjoys the countenance of the Association would make an interesting inquiry, and may, perhaps, some day be profitably pursued. Even Dr. Muir Smith himself has been so misled as to credit the Marylebone Division with support of the scheme, whereas, as a matter of fact, the Division has not yet discussed it.

One other possible misconception may be noted. The "Provident Scheme" now issued in a printed form by a privately constituted "Organizing and Executive Committee" is not in all points identical with the draft that secured the suffrages of a majority of the Metropolitan Counties Branch Council. Hence not even this local and limited organ of British Medical Association activity can be quoted as affording unqualified support to the proposals. And at the best, as already stated, it is not the Branch but merely the Council of the Branch that has recorded a majority vote.

It would seem from Dr. Muir Smith's letter that, even as three voices from Tooley Street once professed to speak for "the people of England," a similar benefit of vicarious representation has been conferred on the county of Sussex. How far these ambitions reach it may be difficult to say, but as, beyond question, the name of the Association is being quoted without authority in the present discussions on hospital policy in London it is well to have the facts plainly on record.—I am, etc.,

London, W., Oct. 24th. C. O. Hawthorne.

SUPPRESSION OF TRINITROTOLUENE POISONING DURING THE WAR.

Sir,—In a note in your issue of October 22nd you give an interesting account of an address by Dr. Addison on "Medical men and public life," and with most there recorded of what was said I am in entire agreement. But there are certain aspects in regard to medical research and its control by Governmental departments which require some consideration.

Dr. Addison states that investigations he asked the Medical Research Council to make into trinitrotoluene poisoning, at a cost of two or three thousand pounds, led to a saving of millions of public money.

Now this awakens a chain of memories in my brain. I seem to remember that, along with my colleagues Wyon and Webster, I went down to a munitions factory in a county "somewhere in England," where girls were dying of T.N.T. poisoning, and that there we studied the subject for several weeks; that we rubbed the poisonous substance into our own skins, and suffered from the poisonous effects; that we worked as operators in the factory, and were assisted by many willing helpers. Finally, we discovered that only a certain percentage of persons were acutely susceptible to the poison, and these were persons who readily let it in through their skins. We tracked out how such susceptible persons could be detected and sent on to other work, and we reported accordingly.

For weeks and months no action was taken, and we were prevented by the censorship from making our discoveries known, and deaths kept on occurring till there was almost a stampede of labour. In one factory alone illness due to T.N.T. was costing over a thousand pounds week.

It was only when I threatened to stump round the munition centres and explain to the workers upon T.N.T. what was the root of the evil that executive action was taken, and within two or three weeks there was not another case of fatal T.N.T. poisoning throughout the whole country. This is now acclaimed as a great triumph for science and medicine, and the late Minister of Munitions tells us that by the expenditure of a very few thousand pounds upon research many millions of pounds were saved to the country. But there might surely be a few words of appreciation for the scientists who solved the problem, not so much after all because the scientists need such words, but because they might make a true orientation in the public mind as to what science stands for.

This is really why this communication is written—namely, to point out the need for perfect freedom in all research.

Bureaucrats cannot tell us how to conduct research, we scarcely know how we do it ourselves, and it is iniquitous when a dawning idea is there to have to explain it to someone in Whitehall. Playwrights complain of censors, but with scientists it is somewhat worse; before they produce their play they have to explain what it is all going to be about. As a result inspiration often succumbs and there is a stillbirth.—I am, etc.,

Oxford, Oct. 23rd. Benjamin Moore.

*** In justice to Dr. Addison, we should point out that our brief account of his address to a medical audience was not a verbatim report.

PRINCIPLES OF BIOCHEMISTRY.

Sir,—I desire to draw the attention of your readers to several regrettable inaccuracies in Professor W. D. Halliburton's review of my *Principles of Biochemistry* which appeared in your issue of July 23rd.

Professor Halliburton complains that, although I am a British subject and, after a stay in American universities, have returned to a British Commonwealth, I have "not returned to English spelling." Professor Halliburton could not, of course, be aware that my manuscript, as forwarded to the publishers, was spelt in strict conformity with English custom. In the proofs I discovered that all my English spellings had been altered to the corresponding American spellings. In answer to my protest the publishers replied that inasmuch as they are an American firm their publications must conform to the literary custom of America. Since this was a matter strictly within their jurisdiction I had no alternative but to submit to their decision. In the same way I imagine that an English publisher or editor might very properly insist that material submitted to him for publication should conform to the literary custom of England.

Professor Halliburton credits me with the statements, which he regards as contradictory, that the vitamins are substances allied to betaine, and "on another page" that they are allied to the purines. I have made neither of the statements attributed to me, but have quoted impartially the various conjectures and experimental findings of Funk, Williams, Seidell, and others. My own opinion concerning the vitamin B is stated on page 193 in the following words:

"The instability of the curative substances and the minute proportions in which they are present in antineuritic foodstuffs render the attainment of any definite conclusions a matter of exceptional difficulty."

Professor Halliburton is mystified, as he says, by my denial of the title of vitamin to the antiscorbutic substance, while admitting it to the category of accessory foodstuffs. Had Professor Halliburton read the whole of my remarks on this subject he would have ascertained my reasons. At the time that the book was written Drummond's suggestion that the known accessory foodstuffs be hereafter designated vitamin A, B and C respectively had not been formulated. For my own part I have felt, and have urged in my book, that the application of the term vitamin indiscriminately to all classes of accessory foodstuffs may ultimately lead to confusion, for when we eventually ascertain their chemical composition and structure we will almost inevitably find that the different classes of accessory belong to very different classes of chemical compound. For this reason I would prefer retaining the descriptive and non-committal terminology originated by Gowland Hopkins, retaining the term "vitamin" to designate one class only of accessory foodstuff—namely, the accessory which cures avian polyneuritis. I have therefore not only denied the antiscorbutic accessory the title of vitamin, but also the fat-soluble accessory, and my reasons for so doing are explained on page 193 of my book. It may be that the consensus of opinion will disagree with me in this matter, and I am perfectly ready to fall in with any consistent policy which may be agreed upon by the majority of

writers, but I still consider that the terminology which I have proposed has many arguments to recommend it.

According to Professor Halliburton, when I state that the hormone of the posterior lobe of the pituitary body is allied to ergamine (β-iminazolylethylamine) I am speaking "without authority." My "authorities" were T. B. Aldrich and M. Guggenheim. The following, however, is a citation from Barger's *Simpler Natural Bases:*

"The fact that the bases from a pituitary extract give the Pauly reaction suggests a connexion with histidine, and, moreover, β-iminazolylethylamine, which is obtained from histidine by decarboxylation, also causes powerful contractions of the uterus. Possibly, therefore, the pituitary active principle is a polypeptide-like derivative of histidine."

The recent work of Koessler had not appeared when my book was written.

Professor Halliburton states that my use of the word "amnesia" as equivalent to forgetfulness will be "somewhat of a shock to neurologists." While I do not profess to be a neurologist and am unaware what may be their peculiar view of this matter, the psychologist, who, after all, is the proper authority in such a question, does use the word "amnesia" in precisely the sense that I have used it. I would refer, for example, to William James's *Principles of Psychology*, vol. i, page 384.—I am, etc.,

Adelaide, Sept. 2nd. T. BRAILSFORD ROBERTSON.

We referred this letter to Professor HALLIBURTON, who writes:

I am much obliged to you for letting me see an advance proof of Professor Brailsford Robertson's letter about my "regrettable inaccuracies." I will take his five points one by one.

1. *Spelling.*—I now withdraw my *criticism* and will substitute *commiseration* for the penalty he has had to pay in entrusting his book to an American firm of publishers.

2. *Vitamins: Contradictory Statements.*—The two I referred to are as follow: "The recent work of Williams indicates that the curative principles may be substances having a betaine structure" (p. 189). "The vitamines appear to be nitrogenous substances closely related to the purines" (p. 489). In neither is there anything to show that the author disagrees, and the second sentence (with its context) contains no indication that it is not his own view. One can imagine the bewilderment of a student when these two statements are placed before him. To these two is now added a third quoted in the above letter about "definite conclusions being difficult." An author's duty is to guide students, and the responsibility of choosing which of three views is correct should not be left to the reader.

3. *Vitamin Nomenclature.*—I have now once more read the whole of Professor Brailsford Robertson's remarks in his book amplified by his recent letter. I am still mystified, though I can heartily endorse what he says in his letter: "It may be that the consensus of opinion will disagree with me in this matter."

4. *Pituitrin.*—The statement that pituitrin is allied to ergamine occurs on pages 200 and 381. In neither place does the author point out that this is not his own view. He now tells us that his authorities are Aldrich and Guggenheim, with whose immature and much-criticized work I am well acquainted. There are authorities and authorities. What I complain of in Robertson's statements is that they are undigested and uncritical. He cannot, or does not, distinguish between those who speak with real authority and the remainder who merely "write as the scribes." Professor Barger, whom he now quotes, is a real authority, and shows his wisdom by the use of the adverb "possibly." In one place Robertson says "probably"; in the other he omits any qualification.

5. *Amnesia.*—This point is a small one, and I can safely leave to neurologists a defence of their "peculiar" views, that is if they think it worth while to quibble about words. My little remark was perfectly harmless, and has the merit, like the preceding (2, 3, 4), of being correct.

WHITEHEAD'S OPERATION FOR HAEMORRHOIDS.

SIR,—Early this year, on more than one occasion, I had the opportunity of seeing Sir John O'Conor of Buenos Aires perform his modification of this operation. As it will be weeks before Sir J. O'Conor can write, if he does, on Sir C. Gordon-Watson and others' condemnation of this operation at Newcastle, reported in your issue of October 15th, I would like to state that in his hands it was anything but a severe operation, involved no great loss of blood, and the after-treatment was practically nil, with no prolonged stay in hospital.

I questioned Sir J. O'Conor fairly closely, and he assured me he had never seen an operation case of his again. If he should write I hope he will state his average time over the operation; I remember it was short. From the number of cases on ordinary operating days at the Buenos Aires Hospital it would appear as if haemorrhoids were common in the Argentine, whether due to large meat eating, cocktails, or horse riding I know not. All the cases I saw were males.—I am, etc.,

Ryde, I.W., Oct. 22nd. EDMUND S. HALL.

THE PHYSIOLOGICAL COST OF MUSCULAR WORK.

SIR,—The discussion continued in your columns this week by Professor Waller and Miss De Decker raises issues of such importance if, as I believe, the task of feeding the industrial populations of Western Europe is likely to become more difficult every year, that we must try to avoid confusion of thought. I think some readers of Professor Waller and Miss De Decker's paper may be confused by the use of the term "error" in two different senses, which is almost inevitable in any brief statement.

For the sake of clearness, let me begin with a very much simpler problem—that of measuring the stature of adults. The first stage is the actual measurement of a sample of adults, and each measurement is subject to a greater or lesser margin of uncertainty or "error" dependent upon the precision of the instrument of measurement and the expertness of the operator. This may be called the "error" of observation. The next stage is, having decided within what limits the recorded results are accurate (for instance, by choosing a suitably coarse unit of grouping), to estimate the probability that *another* sample, recorded with the *same* measure of material accuracy, will yield an average differing from that of the first by such or such an amount. Both these operations involve a statistical process of reasoning, but they must not be confused.

Statisticians have grown rather weary of contradicting the statement that a "mathematician" believes the average of 1,000 careless measurements to be more reliable than the average of 100, or 10, careful measurements. What he does assert is that, however exact the measurements, the probable error of sampling must be determined and its magnitude must affect any generalization from the sample to the "universe."

Now it seems to me that the argument of Professor Waller and Miss De Decker in the second paragraph of p. 628 does tend to confuse these points. Their opponents assert (whether rightly or wrongly I shall not here discuss) that Professor Waller's method of measurement is faulty, that it does not accurately record the characteristics *of the sample.* No comparison of the averages of samples such as attempted in the table on p. 628 is an answer to this criticism. We have not here seven measurements of the same sample but seven measurements of different samples, and the error of observation, *not* the error of sampling, which is the point in dispute between Professor Waller and his critics, requires to be investigated on other lines.

That the error of observation of a CO_2 determination is less than that of a determination of the Respiratory Quotient is, I think, quite certain. A preliminary discussion of the point will be found on pp. 68–71 of a paper by Mrs. Hodson, Dr. Tebb, and myself (*Proc. Roy. Soc.*, B, xci, 1919). Since there is a negative error-correlation between the CO_2 and O_2 determinations, the calculation is somewhat intricate and the number of paired analyses at our disposal far too small to give reliable results. But if a CO_2 reading standing alone does not adequately measure the rate of metabolism, the fact that such a reading can be made with a less observational error than a complete determination of the Respiratory Quotient is not an answer to criticism. No amount of arithmetic applied to the published data can settle the point. In my opinion, even the comparison proposed in Professor Waller and Miss De Decker's postscript is insufficient. We should compare the results of indirect calorimetry by the Haldane-Douglas and the Waller method with those of the direct method, and

must make a long series of comparisons. As things stand, there is unlimited scope for circular reasoning. A method is condemned by one side because it gives unexpected results, and the other side uses this very fact as evidence in its favour. Before we discuss the errors of random sampling let us clear up the question of errors of observation.—I am, etc.,

Loughton, Oct. 22nd. MAJOR GREENWOOD.

THE OPERATION OF PROSTATECTOMY.

SIR,—May I be allowed to make one or two comments in support of the view so ably enunciated by Mr. Littlewood and Sir Clifford Allbutt in the BRITISH MEDICAL JOURNAL of October 15th, p. 614, as to the claims of Mr. A. F. McGill to have initiated the operation of prostatectomy suprapubically and by enucleation?

I was present at the meeting at Leeds in August, 1889, when Mr. McGill read his paper on the subject. It met with a very warm and appreciative reception, and the impressive and clear way in which the details of the operation were described was greatly enhanced by the exhibition in the adjoining lobby of the patients who had been so successfully relieved of their troubles. A subsequent speaker referring to this demonstration spoke of "the astounding and unique spectacle of seven or eight old men sitting on a bench with their prostates in bottles on their knees!" Each patient had attached to him a card setting out briefly the clinical history of the case.

Mr. McGill laid great stress on the fact that the mucous membrane was incised with scissors and the enucleation carried out with the finger.

I was so impressed with the eminently satisfactory results of this procedure—so much more deeply than would have been the case if I had merely read of it instead of hearing and seeing for myself—that soon after my return home I enucleated by McGill's method an enormously hypertrophied prostate in a patient who had been under my care for retention of urine for many years. The operation presented no great difficulty, though I was a novice at bladder surgery.—I am, etc.,

Salisbury, Oct. 19th. R. LEWIS WILLCOX.

THE HARVEIAN ORATION.

SIR,—Owing to an unfortunate printer's error (for which you are not responsible) in your issue of October 22nd, page 625, Malpighi is credited with the authorship of *De sedibus et causis morborum*; it should, of course, be Morgagni. May I take this opportunity of asking those Fellows who have received uncorrected copies of the oration kindly to correct the error, which occurs at page 32, line 1.—I am, etc.,

London, W., Oct. 27th. HERBERT R. SPENCER.

Universities and Colleges.

UNIVERSITY OF OXFORD.

AT a Congregation held on October 21st the degree of Bachelor of Medicine was conferred on W. E. Hayes and C. L. Wells.

UNIVERSITY OF CAMBRIDGE.

THE voting on the question of the relationship of women to the University took place in the Senate House on October 20th. Grace I, the "compromise" proposal to admit women to limited membership of the University, was defeated by 908 to 694 votes. Grace II, proposing to confer the titles of degrees by diploma on qualified women, but excluding them from membership of the University, was carried by 1,012 to 370 votes.

The War List.

The *War List of the University of Cambridge, 1914–1918*, which will be published early in December, is based on the work undertaken by the executive committee of the *Cambridge Review* during the war. The material compiled by Mr. J. Austin Fabb has been revised and added to under the editorship of Major G. V. Carey. The list does not include the names of those who only became members of the University after their war service; it contains nearly 14,000 names. The book is arranged by colleges, the names under each college being in alphabetical order and the date of matriculation being given with each entry. The particulars of service recorded are rank and regiment, number of times wounded, distinctions; in the case of the fallen the date, and, when known, the place of death; in the case of those who obtained the V.C. the account from the *London Gazette* of the act for which it was awarded.

UNIVERSITY OF LONDON.

DR. W. B. TUCK, D.Sc.Lond., previously lecturer, has been appointed to the university chair of chemistry tenable at Middlesex Hospital Medical School.

Dr. Charles Bolton, C.B.E., M.D., D.Sc., F.R.C.P., F.R.S., physician to University College Hospital, has been awarded the William Julius Mickle Fellowship of £200 in recognition of the important work in experimental medicine which he has carried out during the past five years.

Mr. H. J. Waring, C.B.E., M.S., F.R.C.S., has been appointed to represent the University of London at the seventh Centenary Celebrations of the Faculty of Medicine of the University of Montpellier on November 5th.

KING'S COLLEGE HOSPITAL MEDICAL SCHOOL.

The Entrance Scholarship in Anatomy and Physiology has been divided equally between C. E. Newman (Magdalene College, Cambridge) and P. B. Wilkinson (King's College, London).

ST. MARY'S HOSPITAL.

The following appointments have been made in connexion with the Medical Unit established at St. Mary's Hospital Medical School:—Director: Professor F. Langmead, M.D., F.R.C.P. First Assistant: C. M. Wilson, M.C., M.D., B.S., F.R.C.P. Second Assistant: Cecil Alport, M.D., M.R.C.P. Third Assistant: E. G. B. Calvert, M.D., D.P.H.

UNIVERSITY OF MANCHESTER.

DR. R. A. WEBB has been appointed demonstrator of pathology. The Junior Research Fellowship in Public Health has been awarded to Dr. William Stott.

UNIVERSITY OF EDINBURGH.

AT the graduation ceremony on October 22nd the degrees of M.B., B.Ch. were conferred upon William N. J. Chapman, and the diploma in Psychiatry upon Rachel M. Barclay.

ROYAL COLLEGE OF SURGEONS OF EDINBURGH.

AT the meeting of the Royal College of Surgeons of Edinburgh held on October 19th Sir David Wallace, C.M.G., was elected president for the ensuing year, Dr. George Mackay vice-president, and Mr. Alexander Miles, F.R.C.S.E., secretary and treasurer.

The Liston Victoria Jubilee prize of £100 has been awarded to Mr. John Smith Fraser, F.R.C.S.E., in recognition of his work on the pathology of the internal ear and its bearing on the surgical treatment of that organ.

The following, having passed the requisite examinations, have been admitted Fellows:

Catherine E. Anderson, P. Chatterjee, P. A. B. Clark, J. McM. Cole, P. C. Davie, T. A. J. Duff, E. C. Dunlop, H. H. Elliot, A. D. Fairley, A. T. Gibb, A. H. Guymer, J. J. Kearney, O. F. Lamb, G. B. Lowe, H. E. McColl, J. R. MacNeill, G. Nicholson, F. C. Ormerod, G. R. B. Purce, J. M. Rakshit, C. G. Richardson, W. S. Robertson, J. Scott, G. I. Strachan.

ROYAL COLLEGE OF PHYSICIANS OF IRELAND.

AT the annual meeting of the College on October 18th the following officers were elected: President, Sir James Craig; Vice-President, Dr. N. M. Falkiner; Censors, Drs. N. M. Falkiner, J. A. Matson, W. G. Harvey, and R. A. MacLaverty. The following were elected Fellows of the College: Dr. Victor Millington Synge and Dr. Robert Marshall.

In the evening the annual St. Luke's Day dinner was held in the College Hall. Before the company sat down to dinner the President admitted the Right Hon. and Most Rev. the Provost of Trinity College, Dublin, to the honorary fellowship of the College.

The Services.

TREATMENT AND TRAINING FOR PENSIONED OFFICERS.

THE Ministry of Pensions announces that the rules governing admission of disabled ex-officers and nurses to concurrent treatment and training have been reviewed in the light of the recently published decision of the Ministry of Labour relating to training. Applications for admission to concurrent treatment and training under the Ministry of Pensions must reach the Commissioners of Medical Services of the various regions not later than October 31st, 1921. Concurrent treatment and training is normally intended for those who can afterwards pass to the Ministry of Labour to complete their training. These arrangements do not for the present apply to officers and nurses suffering from tuberculosis and in consequence requiring treatment combined with training.

HONOURS.

THE King has given permission to the following medical men to wear the Cross of Chevalier of the Legion of Honour conferred by the President of the French Republic in recognition of valuable services rendered during the war:

Sir W. Arbuthnot Lane, Bt., C.B., Sir A. W. Mayo-Robson, K.B.E., C.B., C.V.O., Sir StClair Thomson, Sir Sydney Beauchamp, Dr. E. W. Ginner, Dr. H. J. M. Playfair, Dr. G. C. L. Vintras, Mr. Dudley d'Auvergne Wright.

DEATHS IN THE SERVICES.

Brigade Surgeon Lieutenant-Colonel Arthur Bowen Richard Myers, Brigade of Guards, retired, died in London on August 6th, aged 82. He was the son of John Bowen Myers, of Ivy Tower, Tenby, was educated at St. Mary's Hospital, London, took the diplomas of M.R.C.S. and L.S.A. in 1859, and joined the Coldstream Guards as assistant surgeon on September 26th of that year. He was promoted surgeon-major in the Scots Guards on March 14th, 1883, and to brigade-surgeon of the Guards' Brigade on May 13th, 1888, and retired on November 4th, 1891. He served with his regiment in the Soudan in 1885, in the Suakin campaign, and received the medal with a clasp and the Khedive's bronze star. In 1870 he received the Alexander prize and gold medal for an essay on diseases of the heart among soldiers, and contributed an article on exercise to Quain's *Dictionary of Medicine*; he was the author also of *Life with the Hamran Arabs*, an account of a sporting tour of some Guards' officers in the Sudan during the winter of 1874–75. After his retirement he did much public work; he was chairman of the training ship *Exmouth*, chairman of the St. George's, Hanover Square, Committee of the Charity Organization Society, and served on the board of guardians for the same district.

Lieut.-Colonel Edmund Arthur Roberts, Indian Medical Service, was drowned while bathing at Elliot's Beach, near Madras, on September 5th, aged 42. He was born on January 16th, 1879, educated at King's College, London, and took the M.R.C.S. and L.R.C.P.Lond. in 1903. Entering the I.M.S. as lieutenant on January 30th, 1904, he became major on July 1st, 1915, and received a brevet lieutenant-colonelcy on January 1st, 1919. He received the D.S.O. on the same date while serving in Mesopotamia. Since the war he had been in civil employ in the Madras Presidency, where he held the post of district and sanitary officer of the Nilgiri Hills. He was a brother of Charles Roberts, M.P., late Under Secretary for India.

Surgeon Captain Alfred John Pickthorn, R.N. (retired), died at Dover on September 26th, aged 57. He took the L.S.A. in 1885 and the M.R.C.S. in 1886, became fleet surgeon on February 11th, 1902, and surgeon captain on the retired list on November 17th, 1918.

Obituary.

LIEUTENANT-COLONEL E. M. WILSON, C.B., C.M.G., R.A.M.C.

Lieut.-Colonel Edmond Munkhouse Wilson, C.B., C.M.G., D.S.O., R.A.M.C. (retired), died in Queen Alexandra's Military Hospital, Millbank, on October 9th, aged 66. He was born at Oundle, Northampton, on October 4th, 1855, and educated at St. George's Hospital, taking the M.R.C.S. in 1877, the L.R.C.P.London in 1878, and the D.P.H. at Cambridge in 1892. After filling the post of house-surgeon at the West London Hospital in 1877–78 he entered the R.A.M.C. as surgeon on July 30th, 1881, becoming lieutenant-colonel after twenty years' service, and retiring on September 28th, 1904. He had a long list of war service. He served as a civil surgeon in the Zulu war of 1879, receiving the medal with a clasp, and afterwards in the R.A.M.C. in the Sudan campaign of 1884–85, with the Nile column, medal and Khedive's bronze star; in the Sudan frontier campaign of 1885–86; in the Gambia campaign of 1891–92; in the Ashanti campaign of 1895–96, in command of the base hospital, mentioned in dispatches, Ashanti star, and C.M.G.; and in the Nile campaign of 1898, when he was present at the battle of Khartum, was mentioned in dispatches, and received the D.S.O., as well as the medal and Egyptian medal. In this campaign he was secretary to the surgeon-general. From 1899 to 1904 he was Deputy Assistant Director-General at the War Office. After retirement he was employed at the military prison, Aldershot, in 1904–5, and from 1904 to 1913 as assistant officer in charge of R.A.M.C. records at Aldershot. He rejoined in 1914 for service during the war.

He received the C.M.G. in 1896, the D.S.O. in 1898, and the civil C.B. in 1902. For several years he was the representative of the Army Medical Service on the Central Council of the British Medical Association. In 1918–19 he was President of the West London Medico-Chirurgical Society. He was also secretary of the R.A.M.C. Fund and Benevolent Society.

Lieut.-Colonel Frederic Puisent Maynard, Bengal Medical Service (retired), died of double pneumonia at Audlem, Cheshire, on September 30th. He was born on March 10th, 1864, the son of Thomas Maynard of Preston, and educated at St. Barthlomew's Hospital and at Durham University, where he graduated M.B. with honours in 1885; he took also the M.R.C.S. and L.R.C.P.Lond. in the same year, and the F.R.C.S. in 1900. He entered the I.M.S. as surgeon on October 1st, 1887, became lieutenant-colonel after twenty years' service, and retired with an extra pension on March 11th, 1919. His first six years were spent on military duty, and during this time he served on the North-West Frontier of India in the Hazara campaign of 1891, receiving the Frontier medal with a clasp. In 1893–94 he served as medical officer of the Baluchistan-Afghanistan Boundary Commission, and in 1896 published a report on the botany of the tracts traversed. On his return from the Commission he was posted to civil employ in Bengal, and in 1905 was appointed ophthalmic surgeon to the Medical College Hospital, Calcutta, and professor of ophthalmic surgery in the College. That appointment he held till his retirement, except for a short period in February and March, 1907, when he was sent on special duty to Kabul. Besides his work on frontier botany he was the author of a *Manual of Ophthalmic Operations*, 1908, and *Manual of Ophthalmic Practice*, 1920, and edited the *Indian Medical Gazette* in 1898, during the absence on furlough of the permanent editor, Lieut.-Colonel (now Sir) W. J. Buchanan.

Dr. Trevor Fowler, who died at Redhill on October 13th, belonged to an old Irish family; he was born in 1845 and received his medical education in Dublin, where he qualified with the diplomas of L.R.C.S.I. in 1865 and L.R.C.P.I. in 1867. Thereafter he came to England and settled at Epping, Essex, where he practised for some forty-eight years. He took a special interest in all matters relating to public health, on which he contributed more than one article to the British Medical Journal, and in 1890 he obtained the diploma of D.P.H.Camb. He was medical officer of health for the Epping rural and urban districts, medical superintendent of the infectious diseases hospital, and district medical officer to the board of guardians for many years. He was a very old member of the British Medical Association. Like so many Irishmen, he was devoted to horses, and in his younger days he was an active member of the West Essex Polo Club and was very fond of a day with the hounds. He retired from practice in 1914, having been in indifferent health for some years. Dr. Fowler was twice married, and is survived by two sons and five daughters.

We regret to record the death of Dr. William Percival Nelson, M.C., after a short illness, in his 28th year. He received his medical education at Birmingham University, and took the diplomas of M.R.C.S.Eng. and L.R.C.P.Lond. in 1917. Immediately after qualification he joined the R.A.M.C. Special Reserve and went to France. He won the Military Cross in October, 1918, for his gallantry and devotion to duty in attending the wounded under a very severe bombardment. After having held the posts of house-surgeon and house-physician and resident medical officer at Birmingham General Hospital, he went into general practice at Coalville, Leicestershire; but his health, which had been undermined in the war, broke down, and he died at Carnarvon. He leaves a widow and one son.

Dr. W. Arthur Loxton, who died while bathing at Budleigh Salterton, Devon, was educated at Birmingham and took the diplomas of M.R.C.S., L.R.C.P. in 1887 and F.R.C.S.Edin. in 1896, and graduated M.B., Ch.B.Birm. in 1904. He was surgeon to the Birmingham and Midland Hospital for Skin and Urinary Diseases and medical officer to the Birmingham Venereal Clinic. He was an ex-president of the Midland Medical Society. He contributed a paper on the treatment of chronic gonorrhoea by antigonococcal vaccine to these columns in 1909.

We regret to record the death of Dr. Arthur Jukes Johnson, of Toronto, Canada, at the age of 73. He graduated M.D.Toronto in 1870; subsequently he spent a year at St. Thomas's Hospital, London, and obtained the diploma of M.R.C.S.Eng. In his early boyhood and student days he was closely associated with Sir William Osler, and as medical students they both used the same microscope. Dr. Johnson was pathologist to the Toronto General Hospital for some time, and was for many years recognized as the leading medico-legal expert in Ontario.

Medical News.

THE annual meeting of Fellows and Members of the Royal College of Surgeons of England will be held at the College, Lincoln's Inn Fields, W.C., on Thursday, November 17th, at 3 p.m.

SIR GEORGE T. BEATSON was presented on October 21st with his portrait in oils on the occasion of his retirement from active duties in connexion with the Scottish Branch of the British Red Cross Society, of which he was Chairman of Council and of the Executive Committee, performing valuable work, particularly during the war.

THE annual dinner of the medical staff of the Central London Throat and Ear Hospital will take place at the Trocadero Restaurant, on Thursday, November 3rd, Dr. Wylie presiding.

A POST-GRADUATE course on the diagnosis and practical treatment of medical and surgical tuberculosis will be conducted from November 21st to December 11th at the Hospital for Sick Children and the Hospital Necker, Paris, by Professors Broca and Rénon. The fee is 150 francs, and further information may be obtained at the Faculty of Medicine, Paris.

AFTER thirty-five years' existence as a weekly newspaper *The Hospital*, established and conducted by the late Sir Henry Burdett, has become a monthly journal under the title of *The Hospital and Health Review*. The first number of the new series was published on October 21st.

A HOLIDAY hostel for nurses and V.A.D. members will be opened at Folkestone on November 1st. It has been given and equipped by the Joint Council of the British Red Cross and Order of St. John for the benefit of those who have worked in the nursing services. In this work the Joint Council acts in conjunction with the United Services Fund, and together they administer funds remaining in the hands of the Navy and Army Canteen Board at the end of the war.

FOUNDERS' DAY will be celebrated at the National Hospital for the Paralysed and Epileptic, Queen Square, W.C., on Wednesday, November 2nd. A bazaar will be opened in the out-patient department at 3 o'clock by Countess Beauchamp, wife of the president of the hospital, and the wards will be open for inspection.

THE annual meeting of the Women's Service Bureau was held at Liverpool on October 10th. This bureau works in co-operation with the Public Health Department, and provides outfits for expectant mothers unable to make such provision for themselves, and also provides helps to go daily to homes where the mother is temporarily laid aside; clothing is provided by it for necessitous children, and a workroom has been opened to provide a centre where garments can be made to be distributed among the children of the famine areas in Central Europe. Dr. Mary Scharlieb, who proposed the adoption of the annual report, paid a tribute to the pioneer work of the bureau, and especially congratulated it upon the idea of providing home helps. The honorary treasurer, Mrs. Graham, made an urgent appeal for subscriptions, and Dr. E. W. Hope, M.O.H. for Liverpool, also commended the work of the bureau.

DR. ALEXANDER MARMOREK proposes to begin on November 21st, at the Institut Océanographique (195, Rue St.-Jacques), a course of sixteen lectures in English on experimental medicine and therapeutics. The first lecture will deal with the main lines of actual experimental therapeutics. Among other subjects will be the biological replacement of organs, and problems concerned with cancer, syphilis, tuberculosis, goitre, and diabetes. The last three lectures will deal with vaccines and serums, immunity, and predisposition in infectious diseases. Full details can be obtained on application to Dr. Marmorek at the above address.

PROFESSOR ERNESTO PESTALOZZA has been elected president of the medical faculty of Rome.

THE annual dinner of the past and present students of the Manchester University Medical School will be held at the Midland Hotel, Manchester, on Wednesday, November 9th, at 7 p.m. The President will be Dr. F. Craven Moore, and the Vice-Presidents Dr. D. Dougal, Dr. J. F. O'Grady, and Mr. J. Morley. Tickets, price 15s. 6d., can be obtained before November 5th from the honorary secretary, Mr. W. Geraghty, at the Medical School.

DR. J. W. EDWARDS, Member of Parliament for Frontenac, has been given Cabinet rank with the new portfolio of Minister of Health, Immigration, and Colonization in the Federal Government of Canada.

DR. S. A. FRANCISCO has changed his surname by deed poll to Francis.

THE 168th session of the Royal Society of Arts will be opened on Wednesday, November 2nd, at 8 p.m., when the Chairman of the Council, Mr. Alan A. Campbell Swinton, will give an address, illustrated by experiments, on wireless telegraphy. At a later date a paper on the work of the Industrial Fatigue Research Board will be read by Mr. D. R. Wilson, its secretary.

A CHADWICK LECTURE on dry rot of wood and sanitation will be given by Professor Percy Groom on Thursday, November 3rd, at 8 p.m., at the Royal Institute of British Architects, 9, Conduit Street. Admission is free.

THE London County Council has written to the Senate of the University of London expressing the hope that the Senate and the Board of Education will consider the possibilities of the site at Holland Park before further action is taken to establish the headquarters of the University on ground north of the British Museum. The County Council pointed out that when the decision to go to Bloomsbury was taken it was not known that the site at Holland Park would be available, and that as the educational and town planning authority for London it is deeply interested in the matter. At its meeting on October 24th the Senate replied that the question could not, on its initiative, be reopened with the Government, but that if the Government wished to consider the Holland Park or any other site the Senate would be prepared to co-operate. The Senate, however, points out that the Bloomsbury property was conveyed to the Commissioners of the Office of Works on March 23rd last, and that a portion of the site is already occupied by a university building, the Institute of Historical Research, which has been presented to the University at a cost of about £20,000.

IT has been decided that the gift of £20,000, recently made by Sir Edward Brotherton to the University of Leeds, shall be applied to the foundation of a Brotherton chair of bacteriology.

PROFESSOR OSKAR FRANKL, of Vienna, has been invited by the Royal Academy of Medicine of Dublin to deliver three lectures on gynaecology.

THE Marcel Benoist prize, amounting to 20,000 francs, is awarded annually by the Swiss Government to the scientist of Swiss nationality or domicile who, during the preceding year, has made the most valuable contribution to science, particularly with reference to human life. This year the prize has been presented to M. Arthus, a French scientist domiciled in Switzerland, professor of physiology at the University of Lausanne, for his original work on anaphylaxis and immunity.

M. PICQUÉ has been appointed to the chair of anatomy in the Faculty of Medicine of Bordeaux.

THE Chartered Society of Massage and Medical Gymnastics, which came into existence in June, 1920, by the granting of a Royal Charter to the Incorporated Society of Trained Masseuses in amalgamation with the Institute of Massage and Remedial Gymnastics (Manchester), has issued its register of masseurs and masseuses to the date July 15th, 1921. The register includes those persons who hold the certificates recognized by the Chartered Society, and also those who hold the recognized certificates in medical gymnastics and medical electricity. The register gives, in addition to the names and addresses of those recognized, any additional qualifications which they may have registered, and includes not only masseurs and masseuses in Great Britain and Ireland, but a list of those who hold the recognized certificates in the British dominions and colonies and in foreign countries.

WE are informed that a "Society for Constructive Birth Control and Racial Progress" has been constituted, with Dr. Marie Stopes as president; among the vice-presidents are Sir James Barr, M.D., Sir Arbuthnot Lane, Bt., F.R.C.S., and Sir Archdall Reid, K.B.E., M.D. It has a medical research council, of which Dr. Jane L. Hawthorne, Dr. George Jones, and Mr. E. B. Turner, F.R.C.S., are members. The objects of the society are stated to be: "(*a*) To bring home to all the fundamental nature of the reforms involved in conscious and constructive control of conception and the illumination of sex life as a basis of racial progress; (*b*) to consider the individual, national, international, racial, political, economic, scientific, spiritual, and other aspects of the theme, for which purpose meetings will be held, publications issued, research committees, commissions of inquiry, and other activities will be organized from time to time as circumstances require and facilities offer; (*c*) to supply all who still need it with the full knowledge of sound physiological methods of control."

THE annual Venison Dinner was held at Kingston-on-Thames on October 19th, when a distinguished company assembled on the invitation of the Mayor (Dr. W. E. St.L. Finny). Sir Charles Burge presented to the Mayor and Mayoress a silver cradle in commemoration of the birth of a daughter during their year of office. The Mayor, in expressing thanks for the gift, recalled that the last occasion on which such a presentation had been made was in 1876, and both the baby of forty-five years ago, and the son of Lord Midleton, who had made the former presentation, were present on that evening.

SIR JOHN ARTHUR GODWIN, merchant, of Grassington, Yorks, who died in April last, has bequeathed £500 to the Bradford Joint Hospital Fund. The Bradford Royal Infirmary is to receive 20 per cent. of the ultimate residue, amounting to between £70,000 and £80,000, provided that this institution shall not have been taken over by the Bradford Corporation or maintained out of public funds. The Bradford Royal Eye and Ear Hospital, the Bradford Children's Hospital, and the Bradford Cancer Home are each to receive 6 per cent. of the residue.

Letters, Notes, and Answers.

As, owing to printing difficulties, the JOURNAL *must be sent to press earlier than hitherto, it is essential that communications intended for the current issue should be received by the first post on Tuesday, and lengthy documents on Monday.*

ORIGINAL ARTICLES and LETTERS *forwarded for publication are understood to be offered to the* BRITISH MEDICAL JOURNAL *alone unless the contrary be stated.*

CORRESPONDENTS who wish notice to be taken of their communications should authenticate them with their names—of course not necessarily for publication.

AUTHORS desiring reprints of their articles published in the BRITISH MEDICAL JOURNAL are requested to communicate with the Office, 429, Strand, W.C.2, on receipt of proof.

IN order to avoid delay, it is particularly requested that ALL letters on the editorial business of the JOURNAL be addressed to the Editor at the Office of the JOURNAL.

THE postal address of the BRITISH MEDICAL ASSOCIATION and BRITISH MEDICAL JOURNAL is 429, Strand, London, W.C.2. The telegraphic addresses are:

1. EDITOR of the BRITISH MEDICAL JOURNAL, *Aitiology, Westrand, London;* telephone, 2630, Gerrard.

2. FINANCIAL SECRETARY AND BUSINESS MANAGER (Advertisements, etc.), *Articulate, Westrand, London;* telephone, 2630, Gerrard.

3. MEDICAL SECRETARY, *Mediscra, Westrand, London;* telephone, 2630, Gerrard. The address of the Irish Office of the British Medical Association is 16, South Frederick Street, Dublin (telegrams: *Bacillus, Dublin:* telephone, 4737, Dublin), and of the Scottish Office, 6, Rutland Square, Edinburgh (telegrams: *Associate, Edinburgh;* telephone, 4361, Central).

QUERIES AND ANSWERS.

DENTIFRICES.

R. W. M.—The reaction of a dentifrice, whether alkaline or acid, does not seem to be a matter of importance. A weak free acid or alkaline dentifrice does no harm; it is food débris, constantly in contact with the tooth, and acid—owing to decomposition—that does the initial harm. The object of using a dentifrice is to cleanse the teeth more effectively; for this purpose soap is probably better than anything, and is the basis of many tooth powders and dentifrices.

FLEAS.

"A. B. S." writes: I am engaged in a large industrial practice, and fleas are very numerous in the beds of my patients and on the floor mats, etc. They get on to my person to the number of two to three a day. This, I am afraid, is unavoidable; but when they begin to bite, each bite mark soon rises up into a wheal (like urticaria) about half an inch in diameter, roughly circular and intensely itchy. The wheal persists from twenty-four to forty-eight hours and then subsides. I wish to know whether there is a method of immunizing myself against such a reaction from a flea bite? But as prevention is better than cure, perhaps some of your readers might be able to help with ideas to prevent the fleas getting access to the skin, or at least prevent them biting and driving them off the body again. Of course, wearing breeches or some similar dress would do, for I am convinced that most of the fleas gain access to my skin through the bottoms of my trousers. But such a dress I do not care to adopt in my professional work. Nor do I wish to envelop or pervade myself with some aromatic smelling substance alleged to keep the pests at bay.

*** There is a belief that the regular ingestion of sulphur by the mouth keeps away both mosquitos and fleas. This belief, Dr. Castellani tells us, exists among planters in Ceylon; but in his experience, it is not well founded. Of external applications camphor and menthol are probably the best.

INCOME TAX.

"A." takes a practice, selling one-third share, and asks how his liability is calculated.

*** The net profits *of the practice* should first be ascertained for each of the three previous years. The new firm is assessable on that amount, and "A.'s" personal liability is the tax attributable to two-thirds of the gross assessment.

"PRACTITIONER" inquires as to the deductions to be claimed for a maid-servant and for motor expenses. The inspector of taxes objects to allowing the full cost of one maid-servant, and wishes to deduct £50 from car expenses for private use.

*** It is impossible to lay down any rule for determining the proportions applicable to private use; it must clearly depend on individual circumstances. In the case of the maid-servant, the cost of the cleaning the surgery and waiting rooms and of attending to the door are obviously professional expenses, but in so far as the maid's time is spent on "making her master's bed and attending to the requirements of the bedroom" and laying and waiting at the table, she is doing "private" work. But whether that would fairly represent "one-half" of her total duties cannot be stated.

LETTERS, NOTES, ETC.

THE DEGREE OF M.D. BRUX.

DR. ARTHUR HAYDON (41, Buckland Crescent, N.W.3), Honorary Secretary of the Brussels Medical Graduates' Association, has received the following letter from the Foreign Office, dated October 10th, 1921: "I am directed by the Marquess Curzon of Kedleston to inform you that His Majesty's Ambassador at Brussels has received a note from the Minister for Foreign Affairs stating that no privilege has been withdrawn from British and Colonial students who have obtained a degree of M.D. at the Free University of Brussels. As regards the future, the university authorities have decided, in order to promote the relations of the university with foreign countries, that all foreign students should be called upon to fulfil the same regulations, and that they therefore cannot concede special privileges to British and Colonial students. The latter may still enter their names at the university under the conditions laid down on page 13 of the *Reglement Organique*, and on page 2 of the *Reglement pour la Collation des Grades Scientifiques*." This appears to mean that the regulations regarding the entrance examination in elementary subjects and the period of residence at the university are to be adhered to, but Dr. Haydon hopes shortly to be in a position to supply further particulars.

"ANOTHER CURE FOR CONSUMPTION."

"R. B. G." writes: Under the above heading (July 23rd) a Punjab correspondent wrote that eating monkey's flesh was believed in India to cure consumption by causing vomiting, etc. In Scotland a popular belief prevailed that the mere act of vomiting would cure the disease, and I remember a mother of a phthisical son telling me, a number of years ago, that she took her son "for a sail down the watter," and as the weather was rough she noticed him "gang near the side o' the boat, and was rale prood to see him spewin'." Poor fellow, needless to say the operation did not have the desired effect, as he died not long after, his end probably accelerated by the "cure" his well-intentioned mother had provided for him.

VACANCIES.

NOTIFICATIONS of offices vacant in universities, medical colleges, and of vacant resident and other appointments at hospitals, will be found at pages 27, 30, 31, 32, 33, and 34 of our advertisement columns, and advertisements as to partnerships, assistantships, and locum tenencies at pages 28, 29, and 30.

THE appointments of certifying factory surgeons at Eyam (Derby) and Rufford (Lancaster) are vacant.

SCALE OF CHARGES FOR ADVERTISEMENTS IN THE BRITISH MEDICAL JOURNAL.

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NOTE.—It is against the rules of the Post Office to receive *poste restante* letters addressed either in initials or numbers.